Marine Review

The National Publication Covering the Business of Transportation by Water

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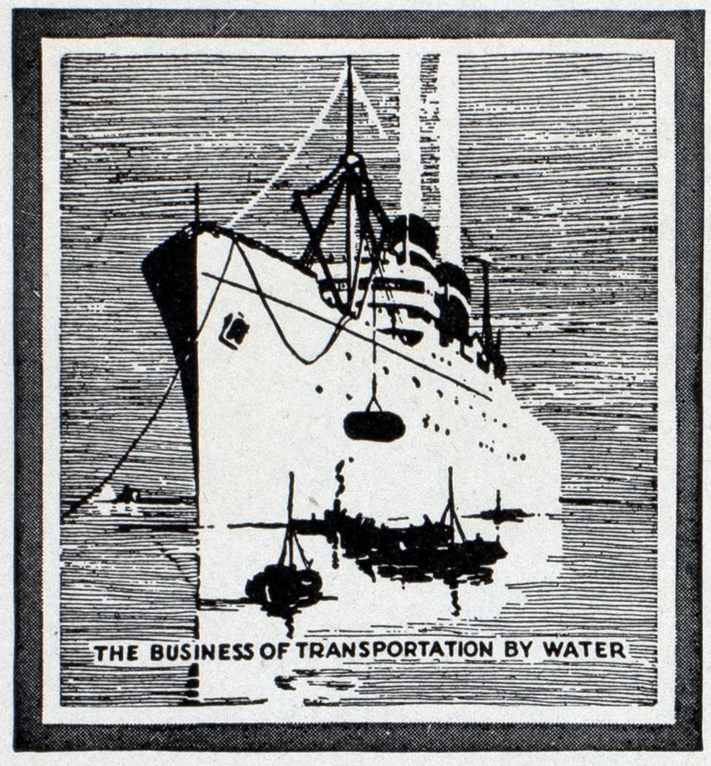

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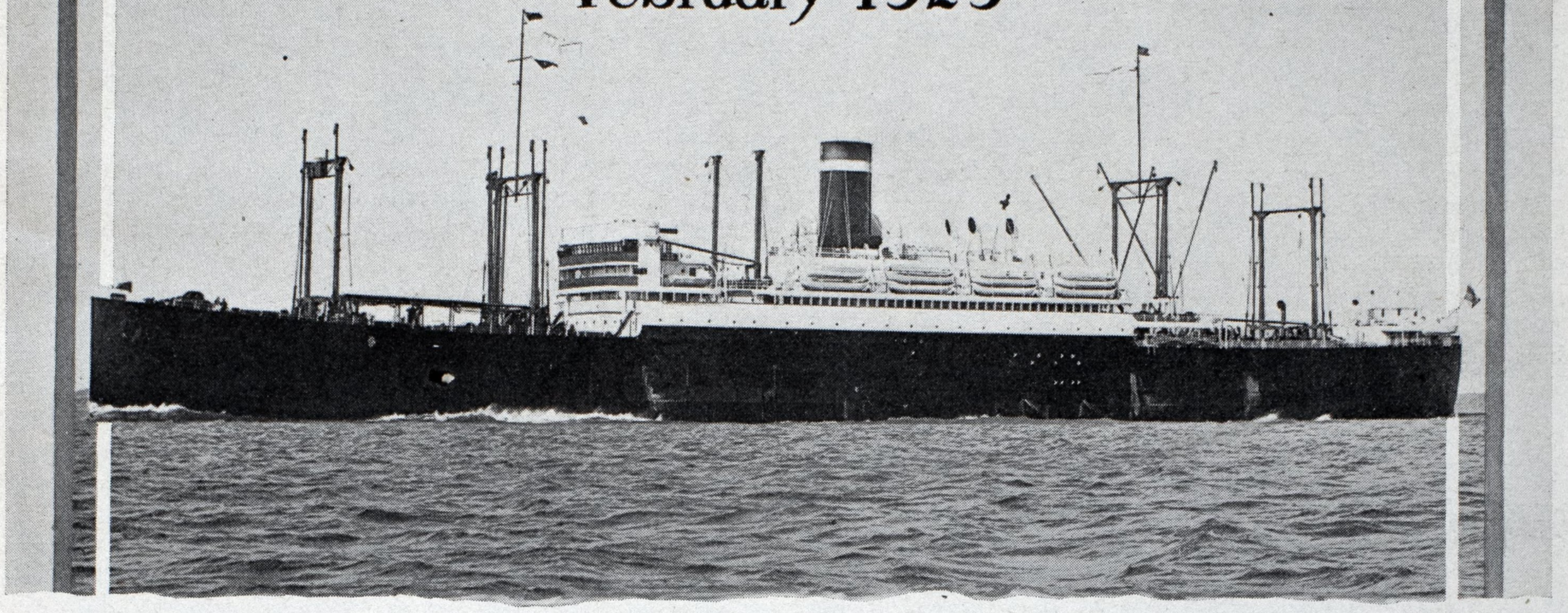


United States Liner President Roosevelt Entered in New York Havana Run to Meet Cunard Competition

Cunard Ignores American Protests
Enters Caronia in New York-Havana Run

Editorial

WHAT would the British say or do or how would they feel if an American shipping company, thinking they could coin money by doing so, should enter an especially fine vessel in the cross channel service from Dover to Calais? We fully appreciate the fact that the British are very open-minded about their so-called coastwise and direct and indirect trade and that normally the world is cordially invited into any of these British trades if they like, and the devil take the hindmost. But would they like it? Wouldn't they feel annoyed and wouldn't they take such measures as they could to offset it if someone should come in to skim the cream of any trade in which they were by long custom fully entrenched? When the Cunard line places the CARONIA during the winter months in the run between New York and Havana it is doing exactly this. Everyone knows that there are no legal restrictions to bar the CARONIA from this trade. Cuba is an independent nation and our coastwise laws do not of course apply. But is the move of the Cunard line fair? Is it something they would welcome having done to them were the positions reversed? Is it good sportsmanship to poach on the other fellow's territory even though that territory be his only through custom and usage and not by any legal right?

Has the Cunard line received communications from any disgruntled travelers complaining of the inadequacy of the service offered by American lines in this run? Has it been urged to improve the service by adding one of the transatlantic liners? Is the Cunard line moved by the idea of improving a poor service or is the Cunard line, being very shipping wise and shipping minded, expecting to reap quick and substantial profits? Isn't it in fact the anticipation of profits rather than any idea of service that is responsible for placing the CARONIA in this run?

Let us see what sort of service the Americans are providing. In the first place there is the Ward line which has served Cuba in hard times and good, in summer and winter, year in and year out for more years than have passed since the Spanish-American war. And now under the provisions of the merchant marine act of 1928 it is going to be possible for this line to put into this service two fine, modern, fast, turbine electric vessels. It will of course take some time to build these ves-

sels but the order has been placed and work has commenced. In addition to this regular run the CALIFORNIA and VIRGINIA of the Panama Pacific line, fully as finely appointed and actually larger and faster than the CARONIA, serve the traveling public in making Havana a port of call. The Grace line with its two fine new vessels the SANTA BARBARA and SANTA MARIA, with a third turbine electric ship now building, also makes Havana a regular port of call in its service from New York to the west coast of South America. Then the United Fruit Co. always noted for the particular excellence of its ships and service have sailings regularly for Havana. The Dollar line with its round the world fleet of large and finely appointed ships makes Havana a regular port of call from and to New York.

It seems clear from all this that as far as service is concerned the Cunard line only imagined they heard the call in thinking of the profits possible for its vessel during the peak of the season. At any rate the CARONIA sailed from New York for Havana on her initial voyage in this service on Jan. 5. It is understood that she did very well and that Cunard officials are entirely satisfied with the results.

Since the sporting instincts of the Cunard line could not be appealed to to keep away from a territory clearly belonging to someone else, we think that Chairman T. V. O'Connor of the United States shipping board was fully justified in meeting fire with fire by placing the United States liner, PRESIDENT ROOSEVELT at the disposal of the Ward line for use in this service as an offset to the Cunarder. Incidentally this action has received the substantial approval of the American public with such good effect that the PRESIDENT ROOSEVELT, sailing from New York for Havana on Jan. 5, the same day set for the sailing of the CARONIA, had all accommodations sold —every berth taken. Furthermore reports indicate that there is an active demand for accommodations not only for the future trips of the PRESIDENT ROOSEVELT but also for all of the other excellent American vessels.

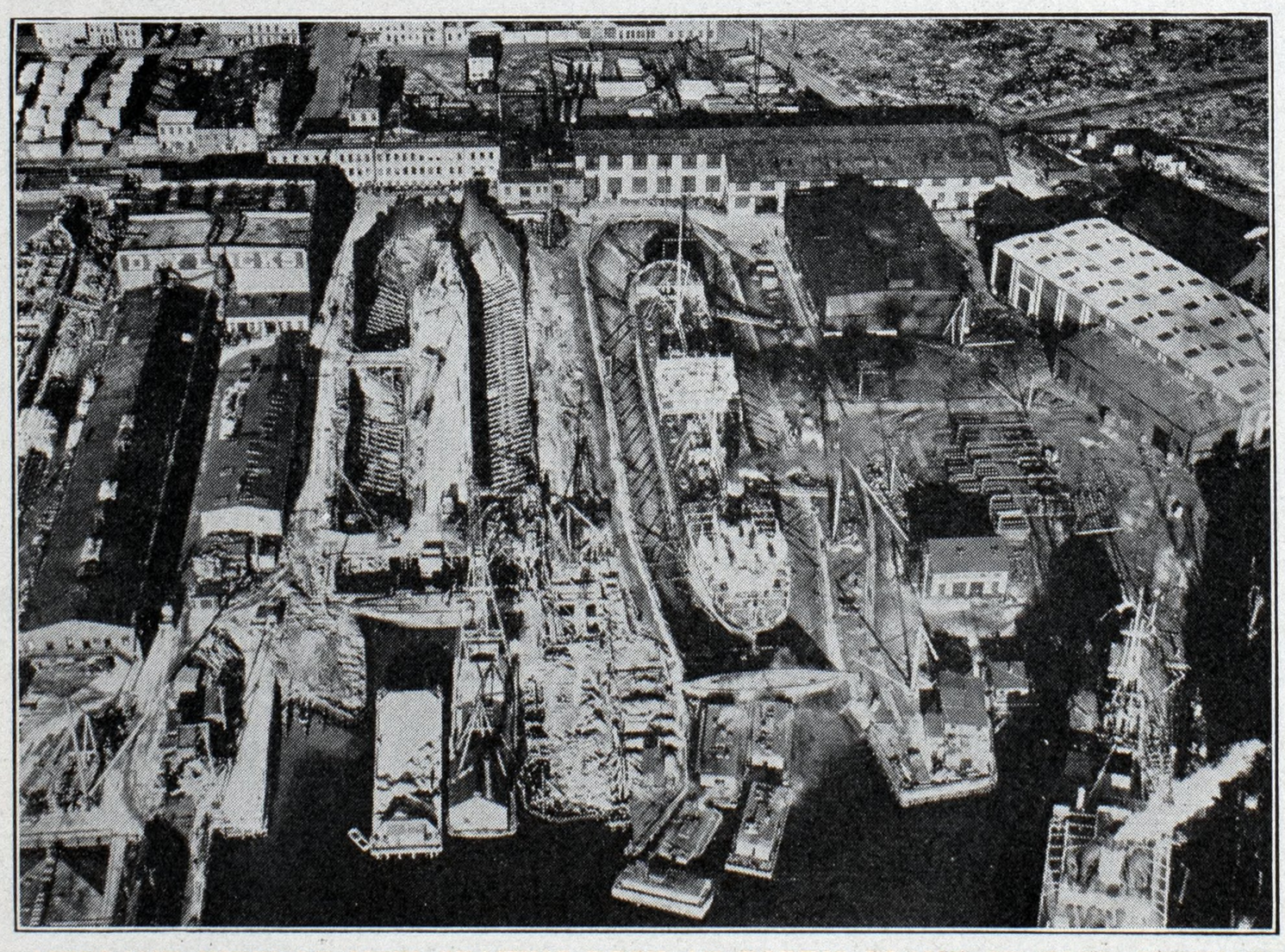
This incident is of much more importance than its immediate and local effect. It shows that American shipping can be seriously attacked in services which it has looked upon for years as uniquely and particularly its own. Needless to say the most careful consideration should be given to possible measures for permanent relief from the possibility of such competition. By this we mean that careful consideration should be given to the possibility of placing the direct trade of the United States in somewhat the same category as coastwise.

What particular moral or ethical right has a foreign ship in the direct trade of the United States? Anyone it seems to us will admit that the priority of right in such trades clearly goes to the ships of the nations involved in that trade. In the case of the United States and another nation, if neither of these nations are particularly well supplied with ships, it is of course perfectly all right to invite the foreigner in to carry the goods at a price if he cares to; but as a sensible man this foreigner must realize that when the two nations he is doing the delivering for get appropriate delivery wagons of their own that it may then be in the nature of things to dismiss him. Haven't we about gotten to this condition as far as our direct trade with Cuba is concerned.

Complete Huge Graving Dock by Fall

DESPITE unusual difficulties encountered in excavation, rapid progress is being made in the construction of the Todd Shipyards Corp.'s mammoth graving dock at its Robins plant in Erie Basin, Brooklyn.

The 500-ton floating steel gate for the new dock, which was fabricated at Todd's Tebo yard, was launched recently. Everything indicates that the dock will be ready for service in the fall, at which time the Todd Shipyards Corp. will be able to dry in one day 175,000 tons of shipping. The new graving dock is 715 feet long, 113 feet wide at the top and 93 feet wide at the bottom and will be the largest dock in New York harbor, thus providing greater facilities for handling large liners that the port has never before possessed.

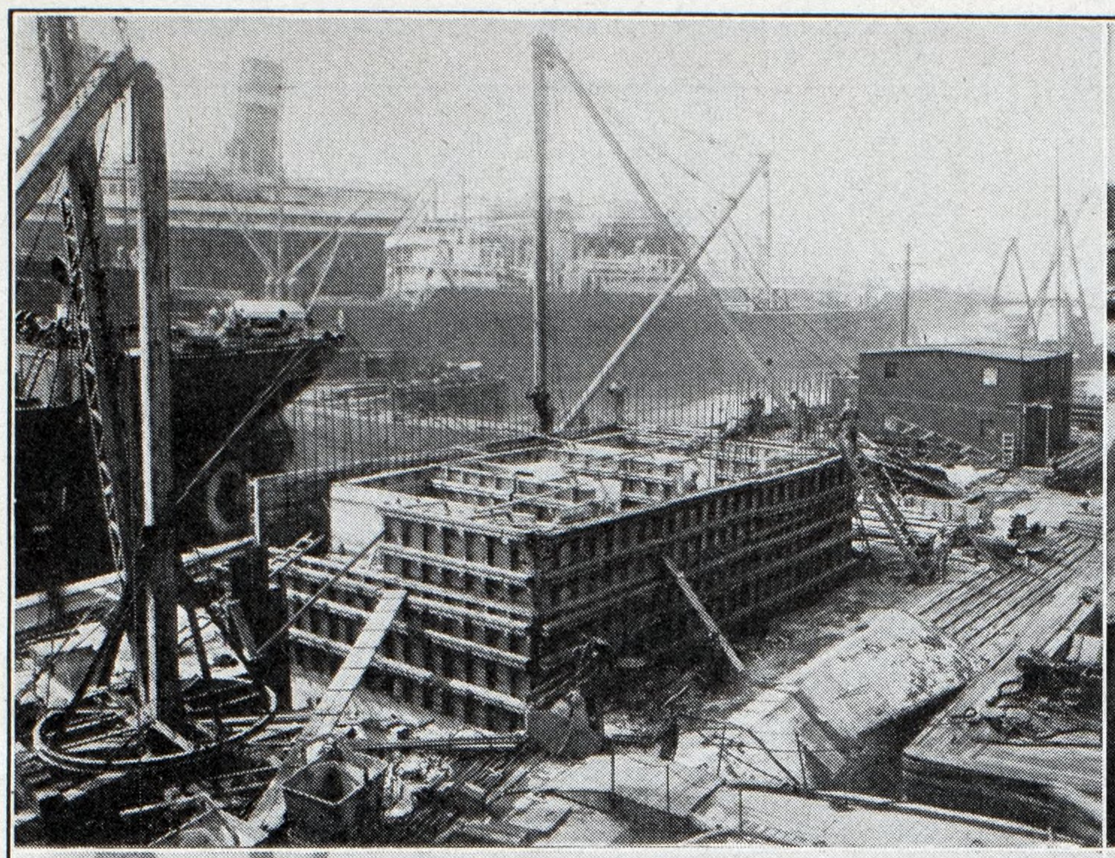


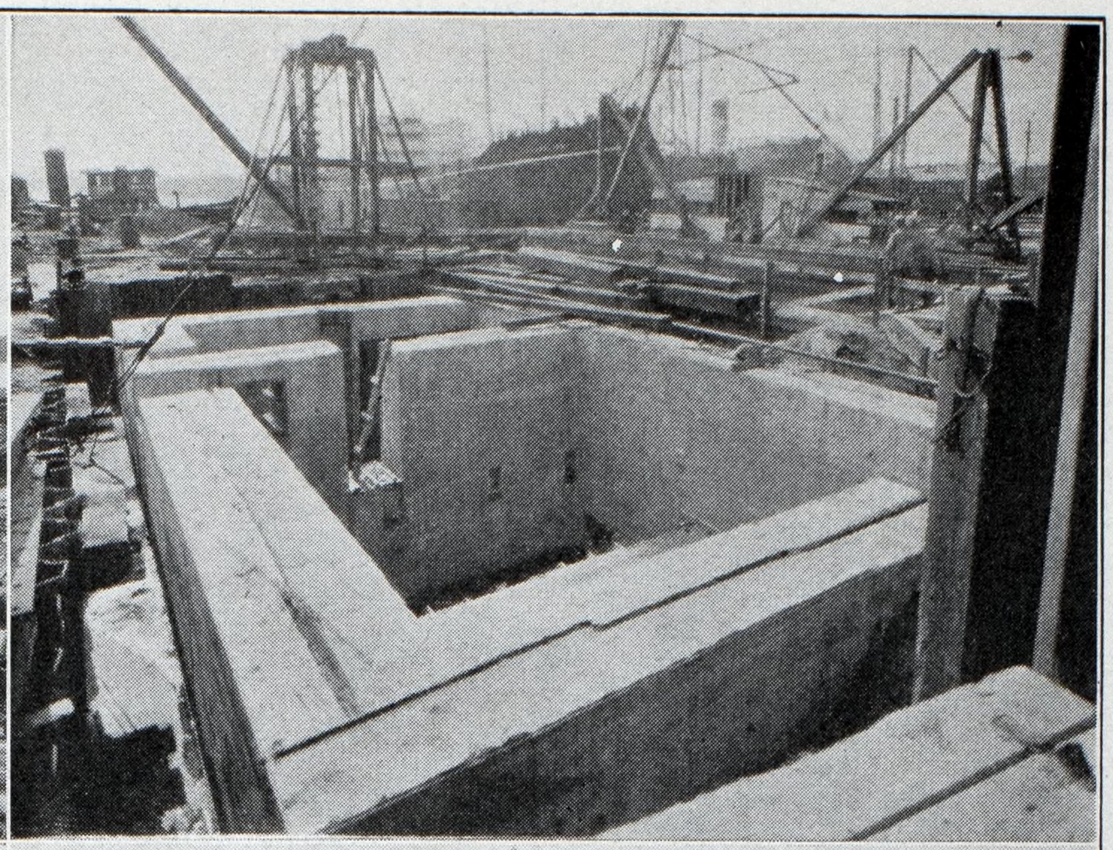
AIRPLANE VIEW OF NEW GRAVING DOCK AT ROBINS PLANT OF TODD SHIPYARD

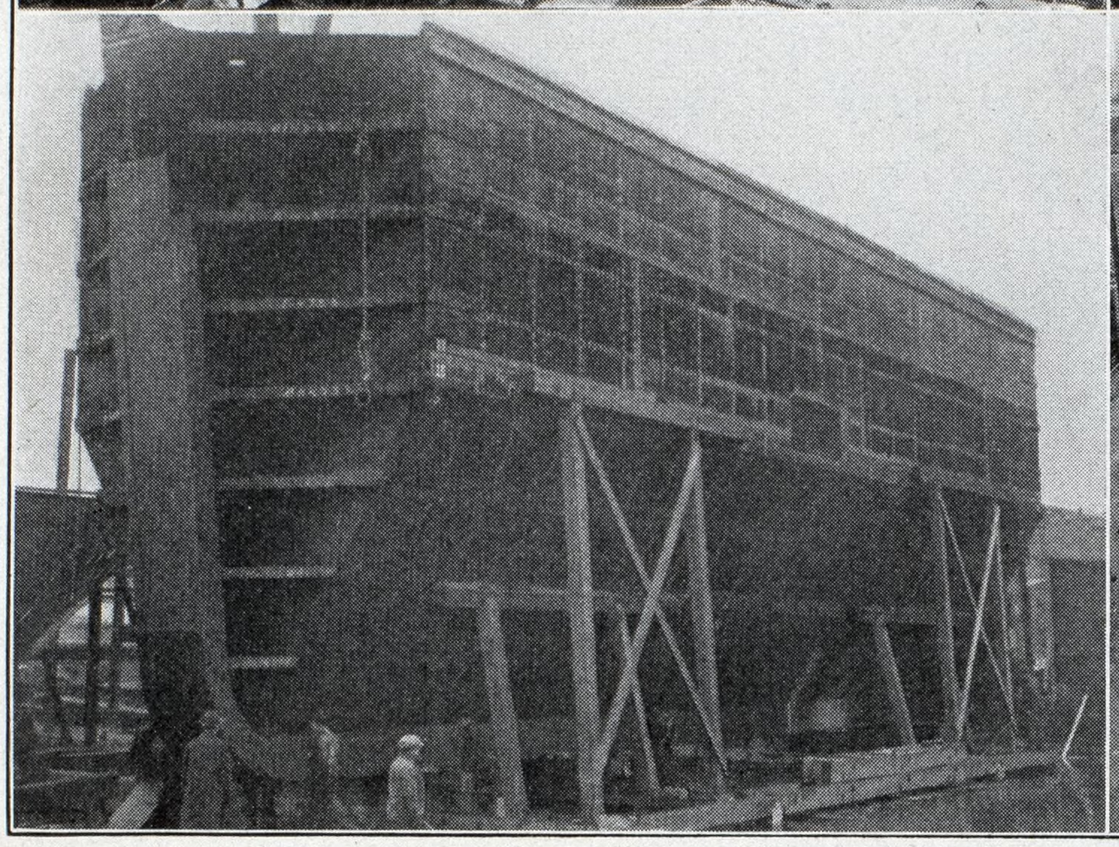
Surveys made preliminary to the commencement of the work indicated that similar soil conditions, found at the time of the construction of the Brooklyn navy yard dock, existed in the Erie Basin area.

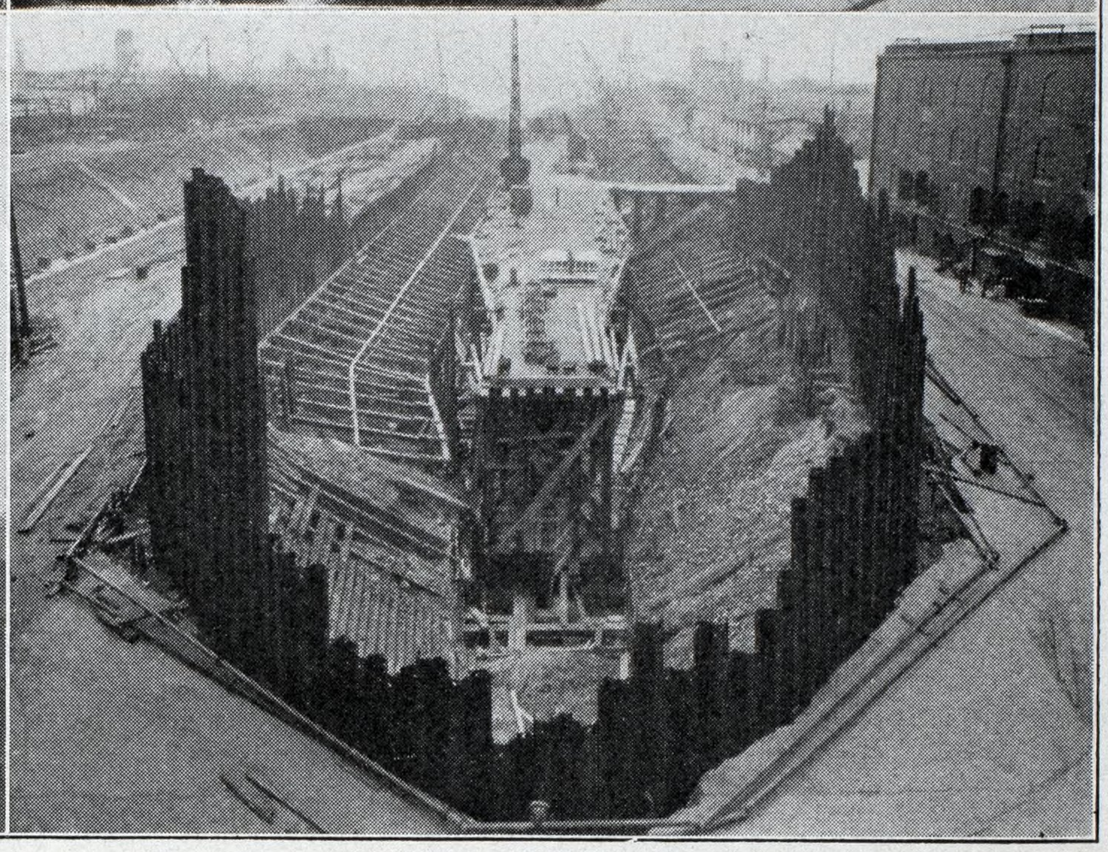
In the navy yard job the contractors started to use steel sheet piling, but when boulders were encountered the piling broke up and when attempts were made to dig out the boulders sand ran through the breaks. A settling of buildings in the vicinity followed and a sewer broke. To complete the job, the site was surrounded by a cut-off of concrete pneumatic caissons which was an effective but a very expensive method of overcoming the difficulty. Admiral F. R. Harris had charge of the navy dock at that time and it is under his supervision that the Todd corporation is building the new dock.

For this job a very effective steel sheet piling is being used. The Bethlehem Steel Corp. had a piling known as the Lackawanna arch web and the German Larsen company had a piling









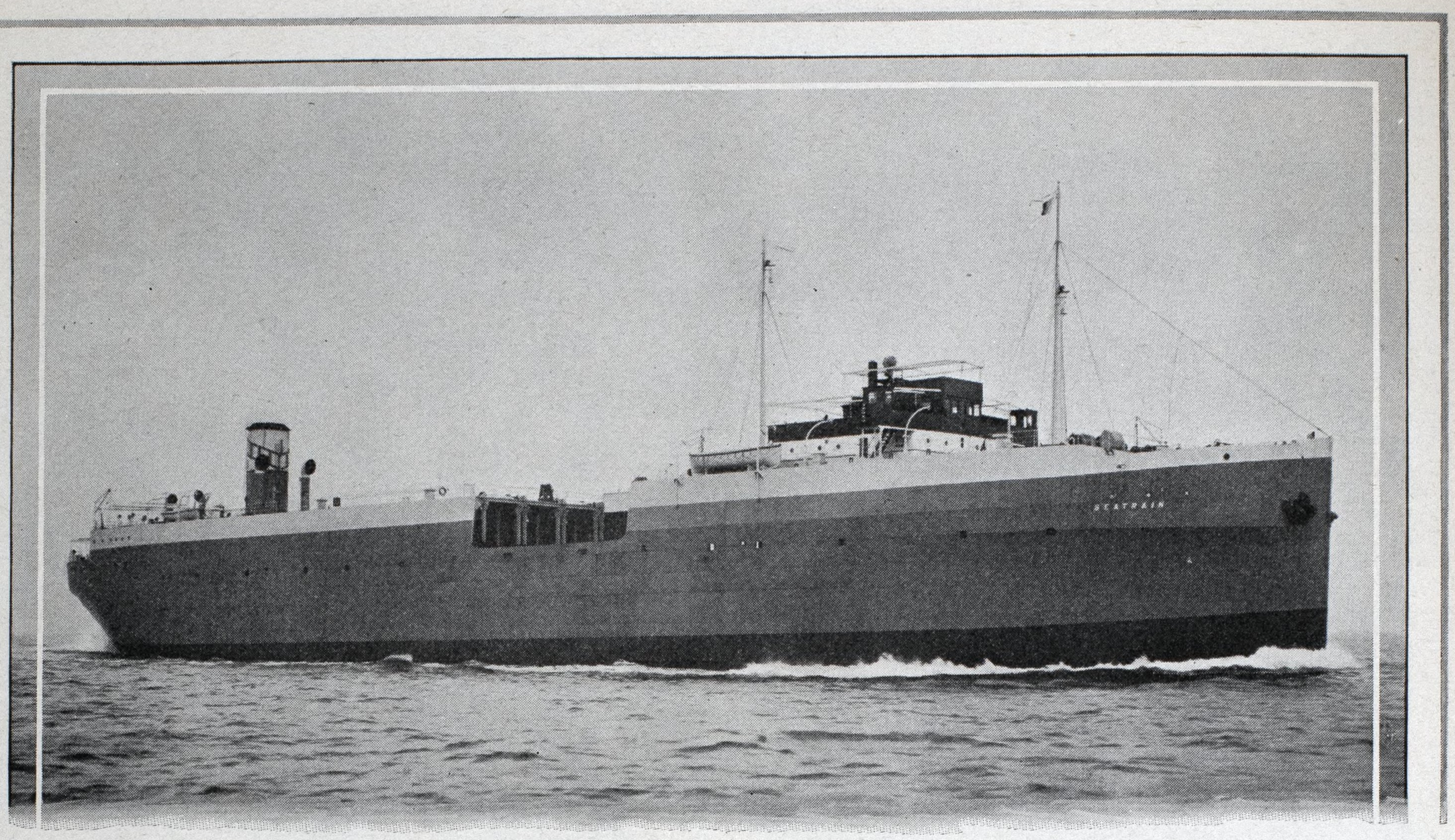
GRAVING DOCK UNDER CONSTRUCTION AT ROBINS PLANT, TODD SHIPYARDS CORP. UPPER LEFT—PUMP WELL BUILT AS OPEN CAISSON. UPPER RIGHT—PUMP WELL SIXTY FEET DEEP BUILT ON SURFACE AND SUNK TO DEPTH BY DIGGING OUT. LOWER LEFT—FLOATING STEEL GATE FOR NEW DOCK. LOWER RIGHT—INSHORE SECTION OF NEW DOCK

that had been used successfully abroad as well as in Florida and on the Gulf. The Bethlehem people, however, developed a new section of Lackawanna very similar to the Larsen product and it was decided to use this instead of the more expensive pneumatic caissons. The piling has been practically all driven and where boulders were encountered the driving was stopped while the boulders were dug around and removed.

The construction work has been divided into two sections, the inshore 500-foot section being on the site of the old dock, which was surrounded with sheet piling and dug to a depth of about 16 feet below the old foundations. This method is an innovation in dry dock construction. Instead of trying to make the dock absolutely watertight, which would require an enormous amount of excavation and concrete, the waterflow was cut off with sheet piling and the center part of the dock, which rests on timber piles, is open, permitting ground water to seep up through the floor and be taken care of by the drainage pumps. The design of the inshore section of the dock is really a combination of the old timber type construction and the modern concrete. The 250-foot outshore section of the dock, which goes beyond the gate of the old dock, will be constructed without removing the water. The site is being excavated by dredges. Timber foundation piles will be driven and steel trusses and forms placed across the dock. The space between the trusses will be filled with concrete under the water with a Tremie, which is a 12-inch pipe constructed with a hopper at the top. The concrete is poured in the hopper, flows through the pipe and fills the area with concrete. After all this concrete is placed, the area is pumped out and walls and floors placed in frame construction and connected up to the inner dock, which, by that time, will be completed. This is a rather novel method of construction. Something similar was tried on the Pearl harbor dock and also on the dock at Kobe, Japan.

To pump out the dock it is necessary to have a pump well in which to place the pumps and other machinery. This well was built on the surface of the ground, 60 feet high. It was sunk to its position by digging out inside three digging wells. It was built up as it was beng sunk to place. This was done so as not to interfere with the handling of vessels in dock No. 2, 50 feet away. This is known as the open caisson method of construction. To finally settle the well to the designed position it was weighted with 1000 tons of pig iron. With the settlement completed, the bottoms of the three digging wells were sealed by depositing concrete under water by the same Tremie, the caisson pumped out and the interior finished. This is a familiar method of constructng deep bridge pier foundations but was never used before on a dry dock pump well. The foundations for the New York State Poughkeepsie bridge are being laid in the same way.

The main pumping plant for the new dock will consist of two large 48-inch spiral screw pumps driven by two 700-horsepower Westinghouse electric motors, so that the dock can be unwatered in less than two hours.

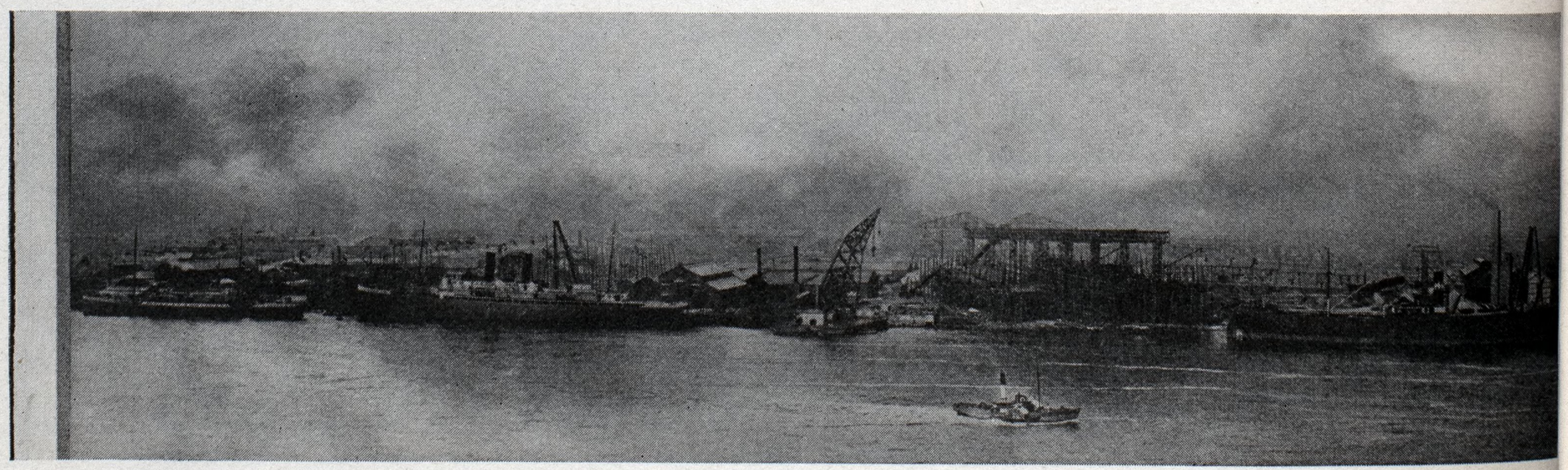


Car Carrier Seatrain. Operates Between New Orleans and Havana. Built by Swan, Hunter & Wigham Richardson, Ltd.

Freight Cars Carried at Low Cost Between New Orleans, Havana

A BOLD and novel idea in transportation by water has been carried out in building and placing in service an ocean ferry for carrying loaded freight cars between New Orleans and Havana. This vessel, named the SEATRAIN, was built in England by Swan Hunter & Wigham Richardson Ltd. under a number of patents, both American and foreign. The SEATRAIN is the first vessel of her kind in the world. Instead of running the railway cars from the shore rails on the carferry rails as is customary in the usual type, the loaded freight cars are lifted from the shore rails by a special crane. One of the accompanying illustrations shows the method of operation. A crane of this type has been installed at the terminal in New Orleans and one at the terminal at Havana. Each crane is designed to safely carry a load of 105 tons in service. This allows for one 80-ton freight car and 25 tons for the supporting cradle and equipment. Further particulars about these cranes will be given later in this article.

A company known as the Overseas Railways Inc., an independent American concern in no way affiliated or connected with or controlled by any railroad or other steamship company has been organized to operate the SEATRAIN. The new carferry sailed from Glasgow bound for Havana on Nov. 14 last year. Extraordinarily bad weather was encountered and her seagoing qualities were given a severe trial. Though in light condition the vessel made a very satisfactory passage. After a period of getting together loose ends and completing all details the vessel sailed from



THE WORKS OF SWAN, HUNTER & WIGHAM RICHARDSON LTD., WALLSEND AND WALKER-ON-TYNE.

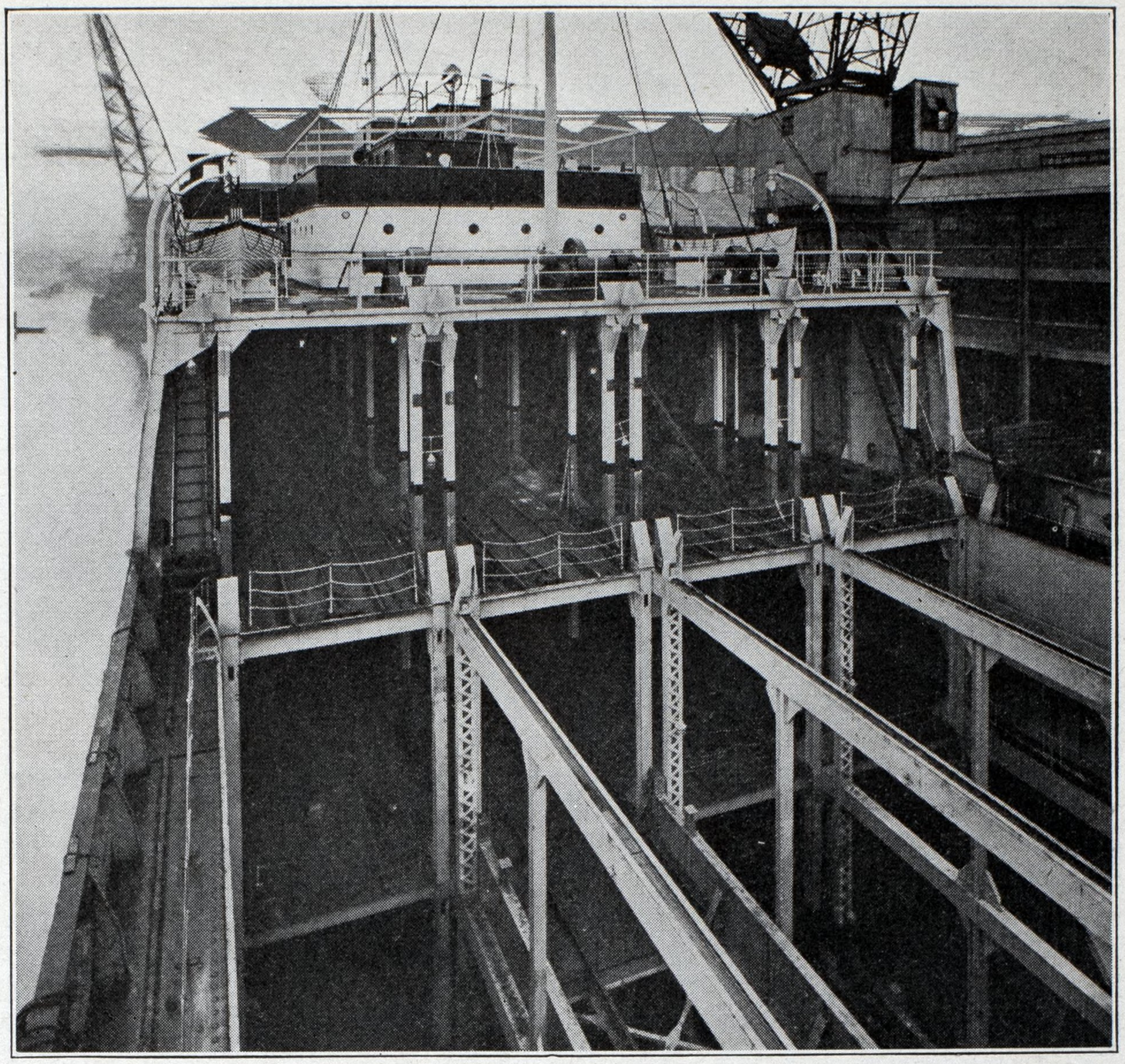
Havana on Dec. 22 and arrived in New Orleans Dec. 25 for her initial loading. Her first official trip in regular service began from New Orleans on Jan. 12. On this first voyage she was loaded to about 60 per cent capacity. This was considered as doing very well as a number of shippers naturally preferred to find out from actual experience how the vessel would make the trip and in what condition she would deliver her cargo. According to the New York representative of the company, Mr. Barnum, everything worked out smoothly on this trip.

Has Capacity of 95 Railroad Cars

The full capacity of the SEATRAIN is 95 railroad cars, all but 10 or 12 loaded. All of these cars can be unloaded and an equal number loaded into the vessel in a period of 10 hours; that is, 95 cars can be removed from the vessel and 95 other cars placed on board at an average rate of about three minutes per car. The distance between New Orleans and Havana is a little more than 600 miles and the schedule decided upon to cover this distance is 52 hours. Somewhat better than this time can be made should it be considered necessary. Present plans call for the sailing of the SEATRAIN from New Orleans every Saturday and from Havana late Tuesday each week.

Though the SEATRAIN is of approximately the same size and cost as the present carferry from Key West, for instance, the new vessel's capacity is more than three times that of the usual type. The ordinary carferry in use on the Great Lakes, in Europe and at Key West is purely a development of the carfloat. Gradually vessels of this type have been enlarged and have been fitted with greater power so that some of these vessels now take on the appearance and are in fact, in mechanical features, the equivalent of seagoing craft. The latest development along this line is represented in two carferries recently ordered by the Pere Marquette railroad for use on Lake Michigan. These ferries are to be fitted with turbine electric drive with a total of 7000 horsepower each which will give them an anticipated speed of 18 miles per hour. There has not been any attempt however to make use of the holds of these vessels for carrying cars and on this account they could hardly be employed profitably on long runs or by companies not controlled or affiliated with railroads.

The chief difficulty from a practical point of view in the proposition to carry railroad cars in a comparatively long haul overseas has been in the design of a hull of reasonable cost with sufficient capacity to accommodate a large number of cars. Furthermore in conjunction with the operation of such a vessel it became necessary to develop a method for quickly loading and unloading cars. The Overseas Railways Inc. seems to have successfully solved both of these problems under the leadership of Graham M. Brush, president and Joseph Hodgson, vice president, both well known American shipping men. In the SEATRAIN the carrying capacity has been trebled without increase in length. From the accompanying illustrations it will be noted that the new vessel is of ordi-



LOADING WELL OF SEATRAIN SHOWING RAILS FOR CAR STOWAGE ON THE DECKS

ENGLAND. IT WAS HERE THAT THE OCEAN CAR CARRIER SEATRAIN WAS COMPLETED IN NOVEMBER, 1928

nary type but so arranged that cars can be carried in the hold and on the 'tween deck as well as on the upper deck. The metacentric height of the present type of carferry is about ten feet while the SEATRAIN has a metacentric height loaded of only two feet making her a much easier boat in a seaway. The shipshape hull also makes her a better sea boat. Loaded freight cars will be carried on three decks instead of in the usual manner on one deck only. Each deck is fitted with four tracks.

Cars Lifted In and Out

As the cars cannot be run directly on the vessel especially designed cranes, as mentioned above, fitted on the docks at both terminals are used to load and unload freight cars from the vessel at practically the same time. The loaded freight car is shunted on a cradle fitted with tracks. The crane lifts the cradle with the car upon it up over the vessel's sides and lowers it into the hold. A mechanical car puller removes the car from the cradle into the hold on tracks. While the cradle is still in place a car intended for unloading is placed upon it by the mechanical puller. This car is then lifted in the cradle from the hold of the ship and placed upon the dock where it is removed from the cradle and another car intended for loading takes its place and is in turn placed on board the vessel. After one track in the ship's hold has been emptied of cars for delivery and filled with cars for shipment, the crane is shifted to lower the cradle over the next track and the process is repeated. When one deck has been filled, the cradles, fitting the hatchway, act as hatch strongbacks and each hold a car while the vessel is in transit. There are no switches in the hold of the ship.

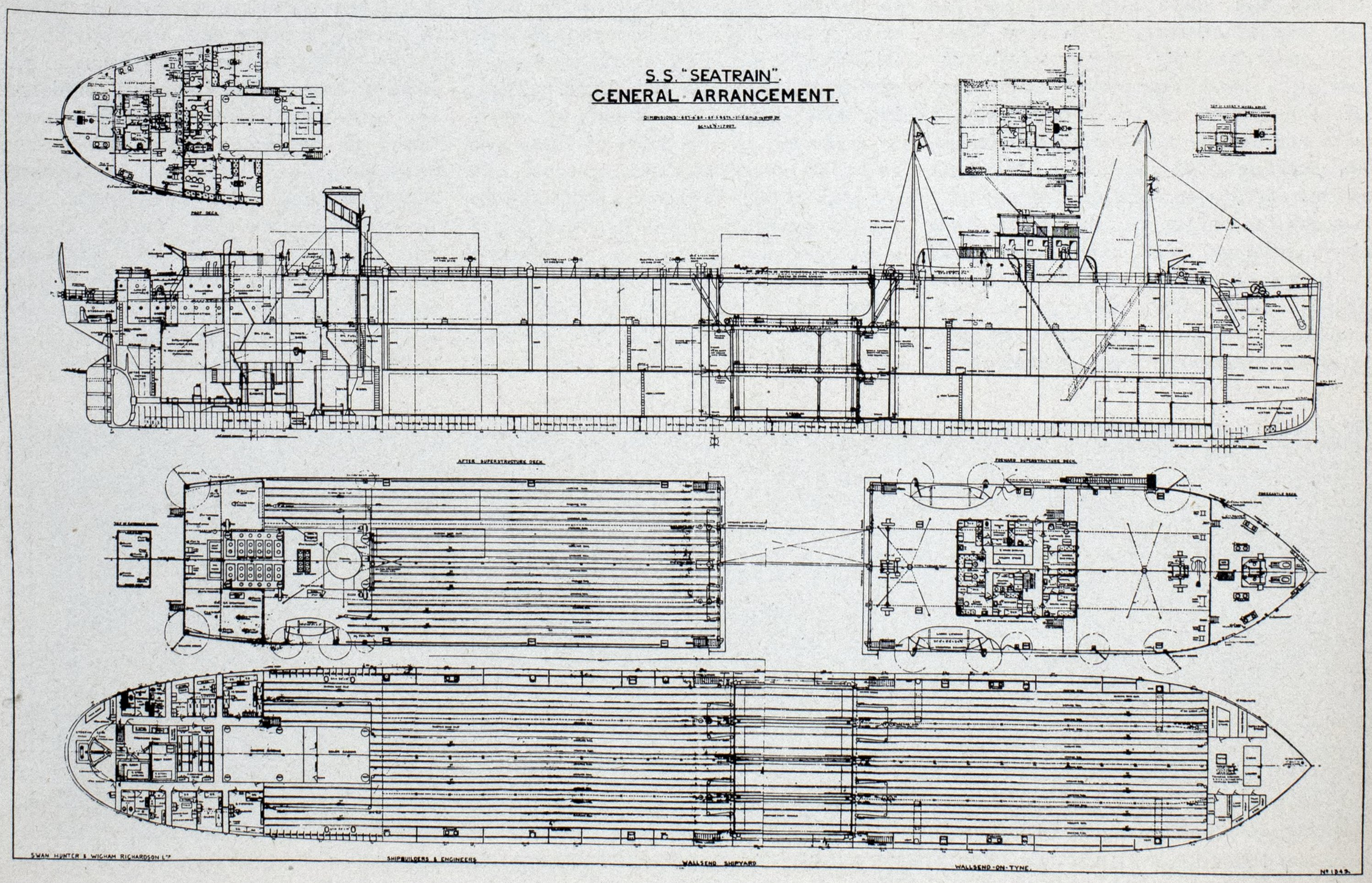
There is of course, a great proportion of lost space in a vessel the type of the SEATRAIN but the saving in handling time, the elimination of labor cost and the quick turnaround of the ship more than makes up this difference. In addition certain kinds of commodities which cannot be handled or transported overseas with profit by any other means will find a definite place in the operation of a vessel of this type, with profit to the operator.

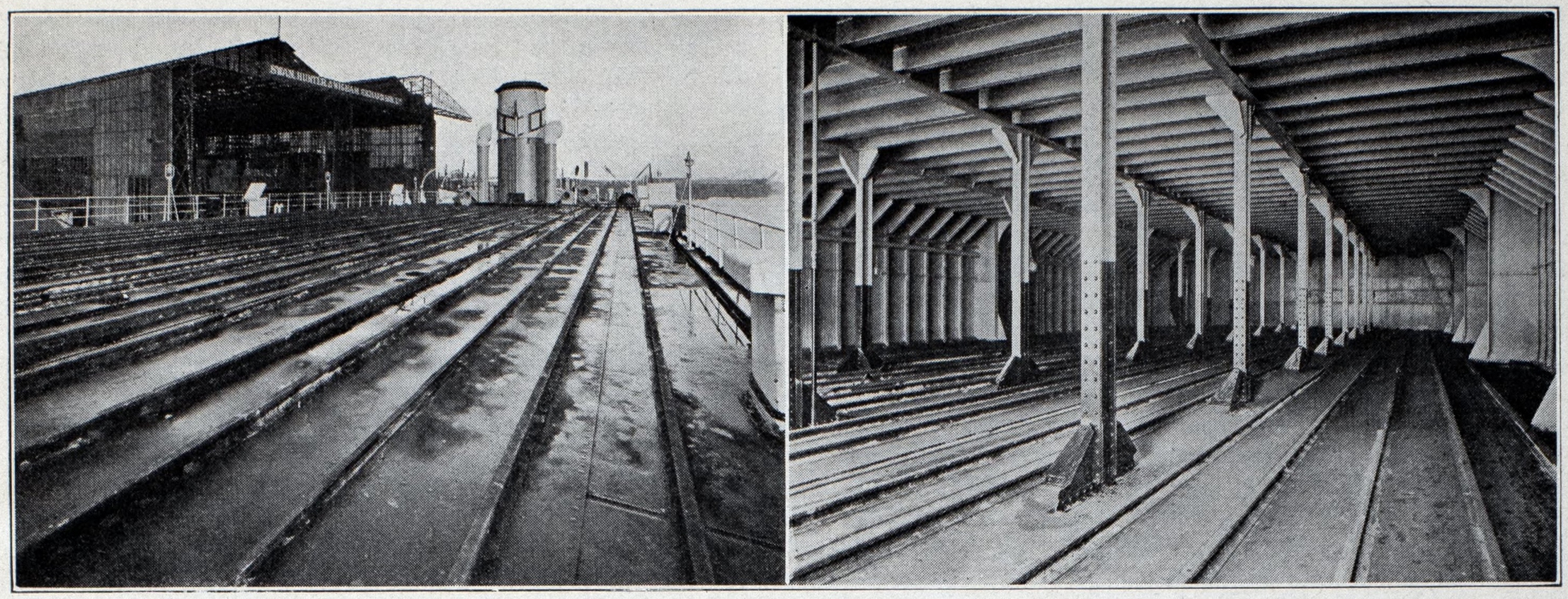
As every shipping man knows water transportation costs can be divided into two major parts; terminal expense and vessel expense. It is fair to say that the cost of receiving, checking, weighing and handling of cargo at terminals together with the maintenance of covered terminals, and the loading and discharging of the ship is over 50 per cent of the total cost of water transportation. On investigation it will be found that the two standard railroads and particular vessels of coastwise and nearby foreign lines spend more than 50 per cent of their time in port in order to load and discharge their cargo. Tankers, ore carriers and colliers spend about 15 per cent of their time in port per year. The cost of maintaining a cargo ship during 35 per cent of its time should be charged as an indirect expense for loading and discharging, as this expense would not be incurred if the vessel carried no cargo.

Big Saving in Port Expenses

The SEATRAIN in contrast with the ordinary cargo vessel can be loaded and discharged in a single working day with a handful of men and if necessary with only the ship's crew, thus not only saving a large item of terminal expense, but also by reason of the quicker turn around saving a good part of the vessel's operating expense. Perishable cargoes in refrigerated railroad cars opens up an additional source of traffic to a vessel of the SEATRAIN type. This will mean in due course the building up of a trade from certain territories of commodities which cannot now be moved by the railroads because the all rail rates are in general more than double water rates.

Water transportation furnished by vessels such as the SEATRAIN is essentially an intermediate one between





CAR CARRIER SEATRAIN. LEFT—RAILS FOR CARS ON SUPERSTRUCTURE DECK. RIGHT MAIN DECK FOR LOADED CARS

ularly appeals to the roads because the railroads absorb the expense of making delivery to the ship's sling and vice versa receiving from the ship's sling. The railroad must assume the burden of loading and discharging the cars and also in many ports high switching charges or lighterage expense for delivery of merchandise to the steamship terminal. It has been found that the average minimum expense to the railroad for loading or unloading a carload of freight at a steamship terminal is 50 cents a ton at each end. If a car holds 25 tons the railroad would save $25 per car for every car that could be delivered to a waterline employing a car carrying ship instead of the ordinary cargo vessel.

Can Handle Any Cargo

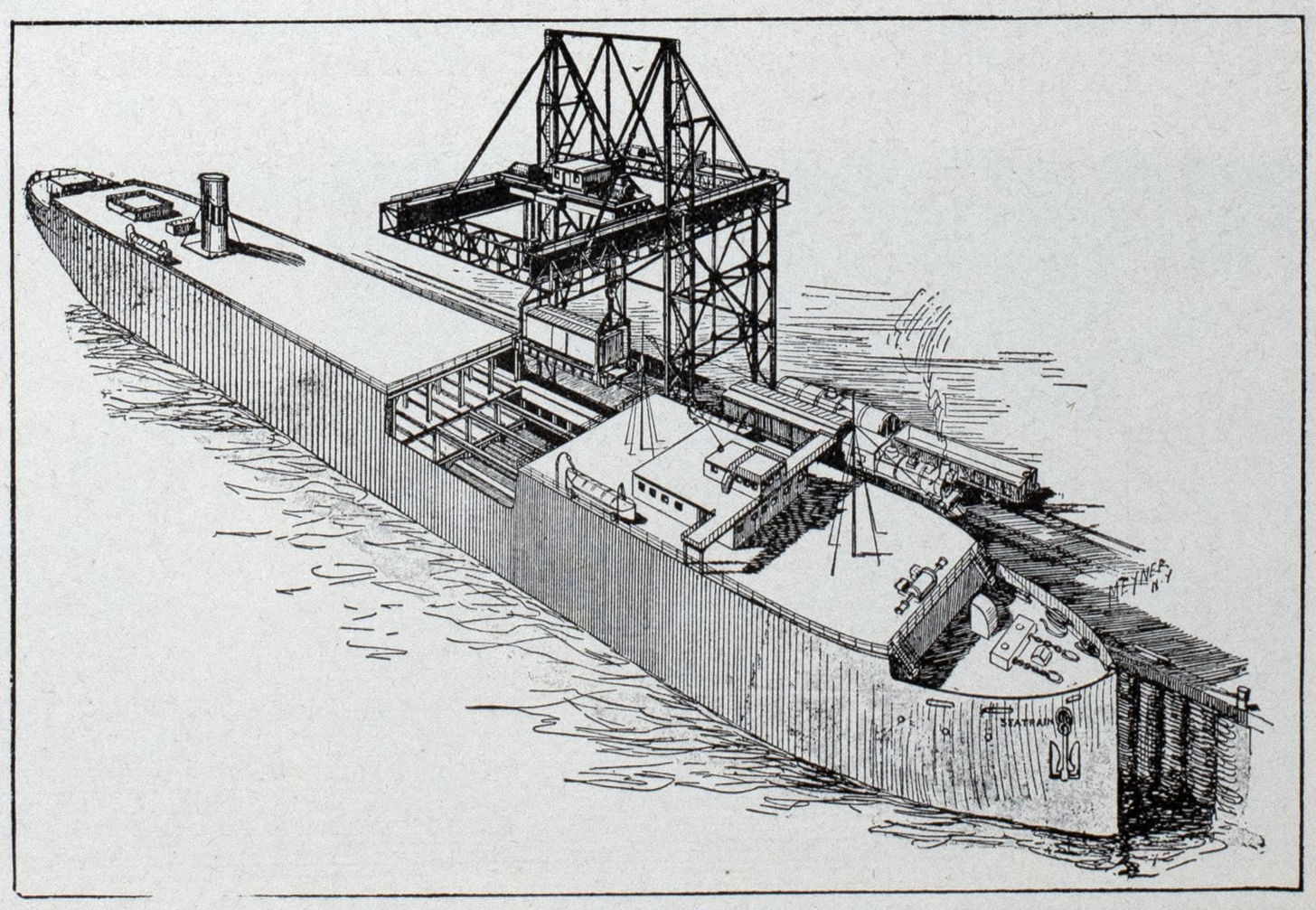
The railroad will also benefit indirectly in that it becomes economically possible to move the traffic from interior points now too far from the ports to compete with other localities because of the long rail haul. By saving in packing charges and other expenses shippers are able to handle goods from points deeper in the interior than they can now by the ordinary steamship lines. This method also opens up a new field for express business either in full carloads or in less than carload containers. It combines speed, safety and low rates, which are not possible with either the steamship lines or railroads under the usual conditions.

The carferry method of transportation is unlike that of the steamship line whose cost varies with the amount of cargo it carries. There is no difference in cost with a car carrier in handling a full load or a light load. The very lowest grade commodities which in most instances are most difficult to handle will produce greater revenues than high grade commodities. The revenue of the car carrier depends upon the car loading as well as the rate per ton. Lumber, brick, steel, copper and other such raw or semifinished products which can be loaded to car capacity are the most attractive commodities for this type of ship.

Using freight cars at sea for carrying goods is economical. When the container, (the freight car) which eliminates the packing of merchandise in whole or in part, can be rented for a dollar a day, the absorption by the transportation company for this rental is only a few cents a ton and is insignificant as compared with the cost to the shipper if his goods had to be packed for ocean shipment by regular steamer. The problem of return loads is almost eliminated when freight cars themselves are used instead of special containers. The railroads of Canada, United States, Mexico and Cuba have had interchangeable equipment for many years. It is to this field that the new type of carferrying vessel represented in the SEATRAIN will be most easily adaptable.

Long Voyages Are Possible

From the analysis given above, as this new type of vessel makes it possible to save terminal expense as well as vessel operating expense, it would seem that its efficiency would go down in proportion to the length of the voyage. This would be so if this type of vessel depended upon saving in expenses to meet the competition of the regular steamship lines but, as has been pointed out, there is probably greater advantage in this type in the possibility of developing with it new and higher revenues. It is impossible therefore to say what length of voyage such ships could make with profit. Each new trade



SKETCH SHOWING METHOD OF LOADING AND UNLOADING FREIGHT CARS ON SEATRAIN

route must be studied by itself. It has been found that runs of 2000 miles and more will be just as profitable as runs of 500 miles, and this is brought about entirely by the conditions of traffic on the longer runs.

The SEATRAIN is a staunchly built single screw steamship to the highest class of Lloyd's. She was launched from the Wallsend shipyard of Swan, Hunter & Wigham Richardson Ltd. on Sept. 13, 1928. Her dimensions are 427 feet 6 inches in length between perpendiculars; 62 feet 3 inches in beam; 22 feet 3 inches in depth to the second deck. The upper deck is 16 feet 3 inches above the second deck while the superstructure deck is 17 feet above the upper deck. A forecastle is built 12 feet above the upper deck while the poop is 8 feet in height. The deadweight is 10,500 tons on a draft of 25 feet 9 inches. Her total capacity is between 90 to 95 railroad cars, weighing, with contents loaded, about 67 tons each. Of the loaded railroad cars approximately 26 are stowed in the holds, 26 on the lower deck, 30 on the upper deck while 13 empty cars are stowed on the superstructure deck. The length of the railroad cars vary from 38 to 54 feet. Service speed of the SEATRAIN loaded is 12 knots.

Steam Propelling Machinery

The propelling machinery for the ocean carferry SEATRAIN is placed aft and consists of a triple expansion steam engine supplied by steam from three oil fired, scotch type boilers working with Howden's forced draft. The cylinder diameters are 28 x 46 x 77 inches with a stroke of 54 inches. This engine will develop 3500 indicated horsepower at about 76 revolutions per minute with a working steam pressure at the boilers of 180 pounds per square inch. The standard type of engine for this power as made by the Wallsend Slipway Engineering Co., Ltd. was adopted because it has proved itself, after many years of trial, a very efficient and economic arrangement.

There is a condensing plant of Weir's uniflux type of sufficient capacity to give a vacuum of 26 inches under ordinary service conditions with sea temperature up to 80 degrees Fahr. The air pump, two bilge pumps and two hot well pumps are attached to the main engine.

A complete installation of auxiliary machinery has been fitted. There are two independent feed pumps, a feed heater of the direct contact type, a combined scum, float tank and feed filter. There is an evaporator of 30 tons capacity with its feed pump driven by the main engine. The ballast and general service pumps are of the vertical duplex type of ample capacity. An auxiliary feed pump and a fresh water pump have also been installed.

Boilers Are Oil Burning

The boilers, three in number, of scotch type are 16 feet in diameter and 12 feet long. There are three furnaces in each boiler and the total heating surface in all three boilers is about 8400 square feet. The oil burners are of the Wallsend-Howden type and the usual oil fuel pumps, heaters, strainers and other fittings have been installed. For ventilation of the engine and boiler room compartments, electric motor driven fans are fitted in conjunction with the ordinary ventilators.

The cranes at the terminals in Havana and New Orleans are of course vital to the success of the operations of the SEATRAIN. The main structure is supported on four legs, the clear distance between inner legs being 57 feet in the direction of the pier. At right angles to the pier the distance center to center of legs is 35 feet. The height of the tower is 104 feet. The length of the trolley travel is 88 feet 6 inches. The horizontal boom is hinged near the front column so that the boom can be raised when not in use. Hoisting drums for the boom and a 40-horsepower motor are located on the rear platform on the trolley track level, and hoisting is performed by means of rope run over sheades at the top of the tower.

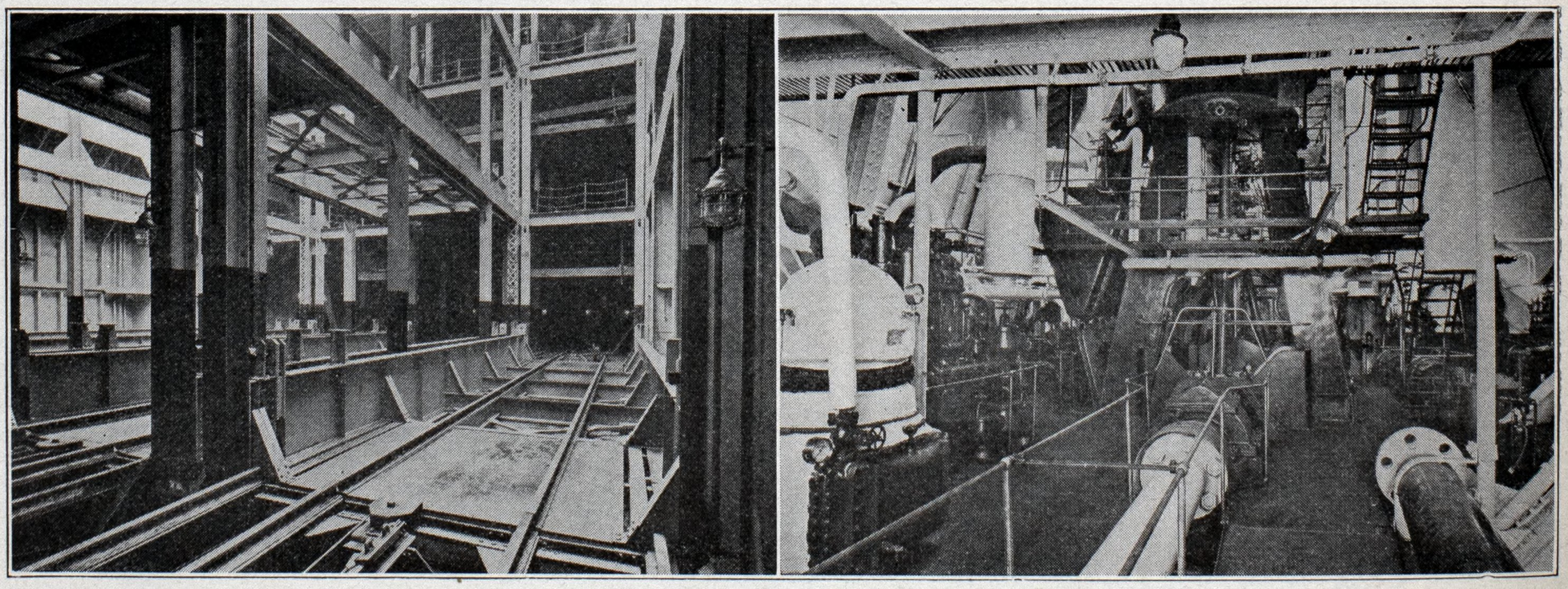
Cranes Are Electrically Operated

The main hoisting machinery mounted on the trolley girders spanning the main boom girders consist of two drums each driven by a 250-horsepower motor. All the columns are made of 14-inch Carnegie beam sections and I bars are used for the boom hangers. The weight of the structural steel in each crane is 220 tons.

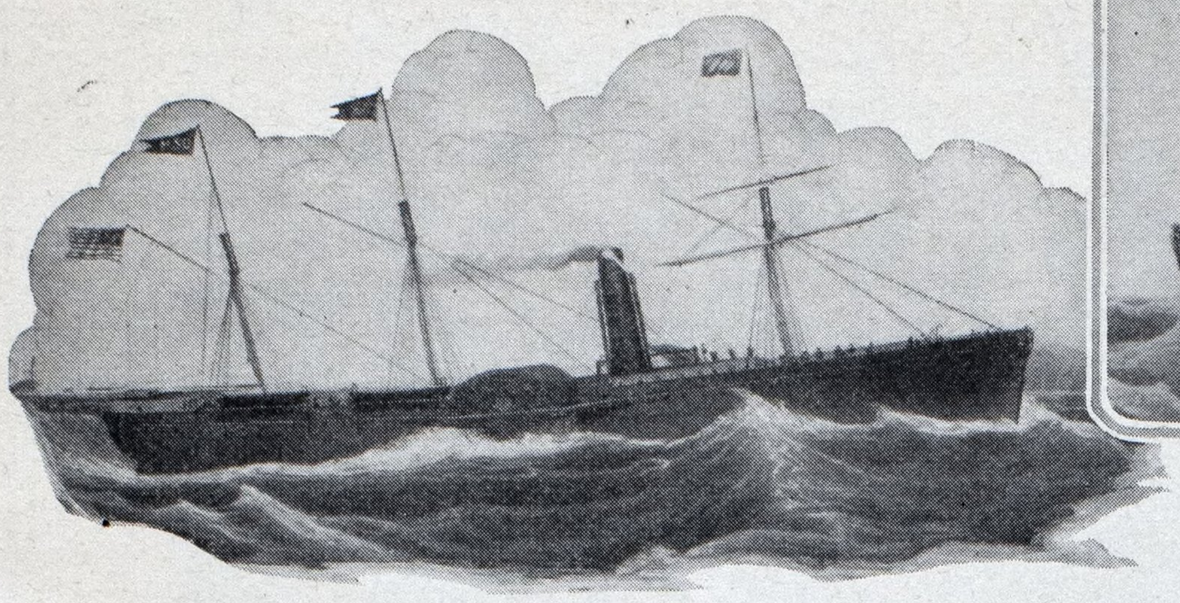
Both cranes were built by the Shaw Crane Putnam Co. Muskegon, Mich. and are the largest cranes ever built by that company. The cranes are completely electrified with General Electric equipment. The control is of the rheostatic type using master switches and is designed for operation from either ship or pier, though normal operation is from the pier on which the crane is located.

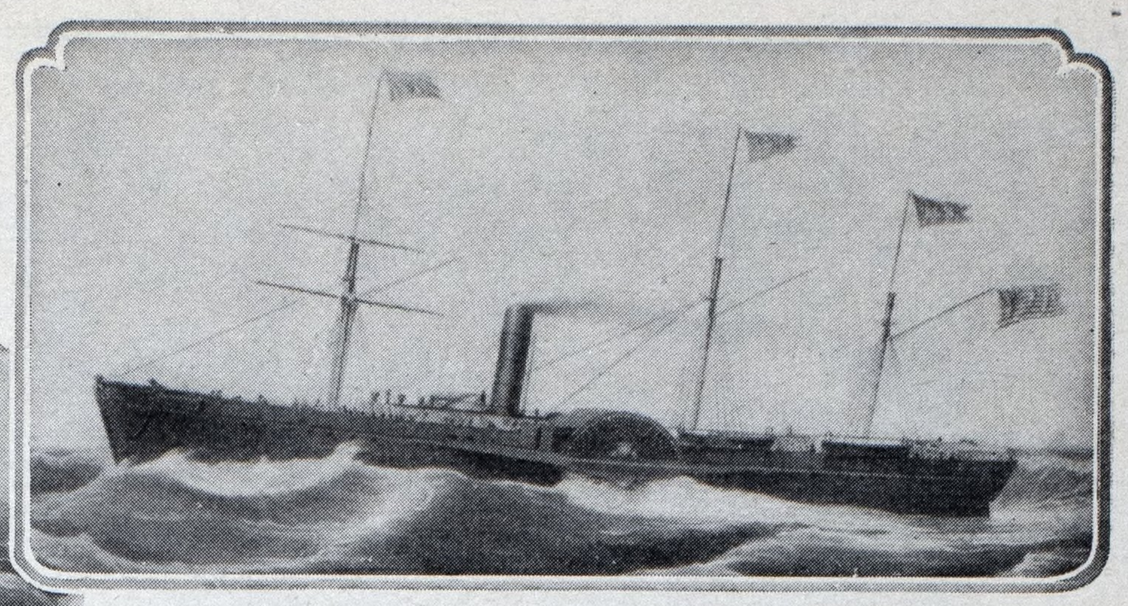
Many advantages may be anticipated for the service inaugurated by the SEATRAIN out of New Orleans on Jan. 12. There will be less need for packing goods in stronger and heavier containers needed for ordinary sea shipment. This will help to reduce the expense for material and labor and will reduce freight

(*Continued on Page* 58)



CAR CARRIER SEATRAIN. LEFT—WELL THROUGH WHICH CARS ARE LOADED AND REMOVED. RIGHT—ENGINE ROOM LOCATED AFT





United States Mail Steamship Atlantic of the Collins Line

The Collins Line United States Mail Steamship Pacific

The Collins Line

Early American Transatlantic Ships

By Richard P. Joy

THE Collins line of transatlantic steamships was founded by Edward K. Collins in 1847. The British government had inaugurated mail payments, or subsidies, to the Cunard line in 1840. In 1847 the United States congress followed suit by offering mail payments to American built steamships. The Collins line was organized and let contracts for four fast steamships for the Atlantic trade, they were named ATLANTIC, ARCTIC, BALTIC and PACIFIC. These steamships were much larger and faster than the Cunard liners, and crossed the Atlantic in less time than the British ships.

The British government gave the Cunard line an annual subsidy of $425,000. This sum was increased to $850,000 in 1852. The Cunard ships averaged at that time, about 1500 tons. The Collins line built ships of 2845 tons and received a mail subsidy from the United States government of $385,000 annually. In 1852 this subsidy was increased to $858,000 but the Collins line ships had cost much more to build than the British steamships, and were more expensive to operate.

The ATLANTIC was built in New York in 1848 by W. H. Brown, her length on deck being 291 feet, 46 feet beam, with a depth of hold of 32 feet. The hull frames were of white and live oak, the bottom being solidly filled with oak timbers to the bilges. The planking was hard pine, copper fastened below the water line and iron fastened above. The frames were strapped, lattice fashion, with iron, making them the strongest steamships of their time. There was one fatal defect, however, there were no water tight bulkheads in the ships.

The author of this interesting historical sketch, Richard P. Joy, is president of the National Bank of Commerce, Detroit.

In the case of the ATLANTIC, W. H. Brown was the builder, with Stillman Allen & Co., furnishing the engines. The architecture and designing was carried out by George Platt while Robert Latou handled the joiner work. The painting was done by Stephen Squires with James Phyfe acting as upholsterer. James West was the commander of the ATLANTIC.

Jacob Bell was the builder of the PACIFIC, the engines of which were supplied by the Allaire Works. The PACIFIC'S architect and decorator was George Platt. The joiner work was done by Young & Cutter, painting by G. C. and J. G. Lugar. The commander of the PACIFIC was Ezra Nye.

All of the Collins line ships, as well as the Cunard ships of that day, were sidewheelers. The Collins liners were equipped with side lever engines, developing approximately 800 horsepower. The steam pressure was 16 pounds, giving the wheels 15 revolutions a minute, driving the ship about 300 miles a day, reducing the Atlantic passage to ten days. The coal consumption was about 80 tons every 24 hours.

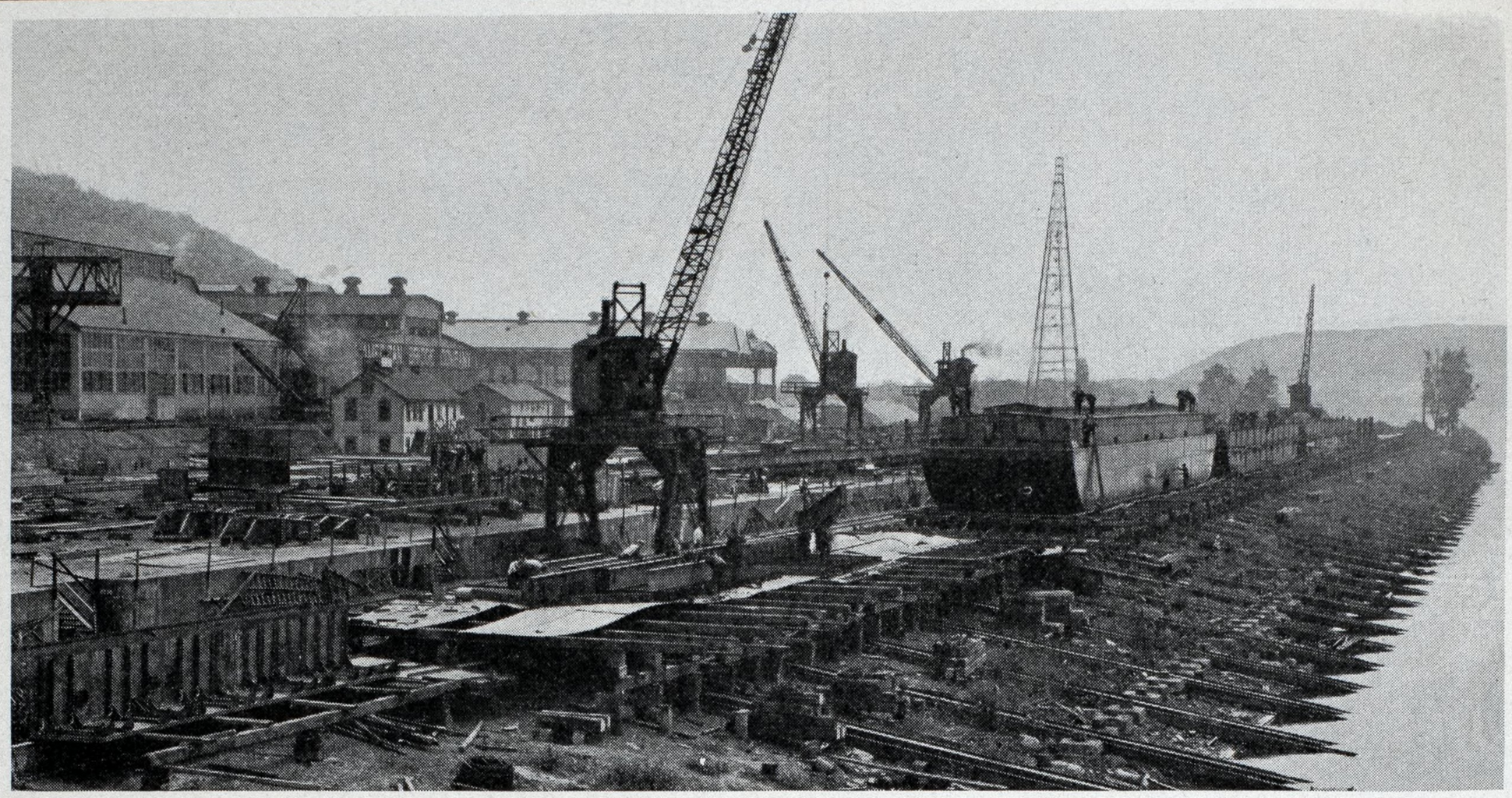
The Collins line ships were the first ocean steamers built with straight stems. The lines of the hull were fine, and the freeboard was ample to insure comfort for the passengers. The ships carried 250 passengers and 2000 tons of cargo. Competition destroyed the Cunard line's monopoly of the trade and reduced freight rates one half, thus benefiting shippers.

In September 1854 the ARCTIC was in collision with a French vessel off Cape Race, and foundered with a loss of over 300 lives, Mr. Collins' wife and children being among the number. In 1856 the PACIFIC sailed from Liverpool for New York and was never heard from again. The Collins line added the steamship ADRIATIC to its fleet in 1855, a much larger ship, but in the same year a bill was introduced in Congress abolishing steamship subsidies. This bill became a law in 1858 and the Collins line failed, as it could no longer compete with the subsidized Cunard ships. Great Britain had a fixed policy of extending aid to its shipping while the American government had none. Edward K. Collins fought a good fight, all honor to him.

Building Car Floats

The Western Maryland railway has awarded contract to the Bethlehem Shipbuilding Corp. to build three two-track steel car floats. The new floats are to be 190 feet long 35 feet beam and nine feet molded depth. Three three-track floats for the Erie railroad are to be 225 feet long, 38 feet 6 inches beam and 10 feet 8 inches molded depth.

Attempts to salvage the White Star liner CELTIC which went aground off Roches point, Queenstown, recently have been abandoned. It is thought, however, that the greater part of the cargo will be saved.



Barge Building Yard of the American Bridge Co., Ambridge, Pa.

Build Modern Floating Equipment for River Traffic Expansion

By W. G. Gude

RAPID growth has characterized traffic over the Ohio river system in recent years. Work now in progress or contemplated in furthering the navigability of the various streams indicates that additional substantial expansion in river tonnage and an increase in river craft construction may be anticipated in the next few years.

The Ohio river system drains the most highly developed industrial district in the United States. On or near the river banks are enormous deposits of mineral wealth, including coal, fire clay and limestone. At the confluence of the Allegheny and Monongahela rivers where the Ohio begins, is located in the great steelmaking center of Pittsburgh. The Monongahela at present is the most important of the Ohio's tributaries. Although only 130 miles in length, it has an annual commerce of about 25,000,000 tons, the larger part of which is confined to the lower half. It carries a large tonnage of coal to the many steel mills along its banks and flows through an active industrial section. The Allegheny river and its tributaries are important branches of the Ohio and are the potential sources of a large amount of commerce. Champions of improvement of the Kiskiminetas and Conemaugh rivers to provide an outlet to the Allegheny maintain that more than 6,000,000 tons of iron and steel annually are available for river transportation in that district, while a billion and a half tons of coal can be mined economically and shipped by river. The annual possible saving to shippers through proposed improvements is estimated at $500,000. Low bridges near the mouth of the Allegheny, formerly deterrents to transportation, have been removed as far as 31.5 miles above Pittsburgh, and construction of dams now being planned will establish a navigable slackwater to Rimerton, Pa., 61 miles above the mouth.

On the Ohio, work is nearing completion on locks and dams which soon will make this stream available for year-round transportation to the Mississippi, a distance from Pittsburgh of nearly 1000 miles, and thence south to the Gulf of Mexico. This construction work on various streams of the system opens new transportation fields to shippers. Considerable additional improvements are being advocated which if approved by congress will further stimulate river traffic. Tonnage figures for the various rivers

River Hull Launchings—1927

Builder	Location	Number	Tons steel
American Bridge Co.	Ambridge, Pa.	132	19,662
Dravo Contracting Co.	Pittsburgh	113	22,600
Riter-Conley Co.	Leetsdale, Pa.	60	9,000
Midland Barge Co.	Midland, Pa.	42	7,650
Marietta Mfg. Co.	Point Pleasant, W. Va.	49	5,310
Jones & Laughlin Steel Corp.	Pittsburgh	29	4,956
Nashville Bridge Co.	Nashville, Tenn.	25	3,650
Howard Shipyards & Dock Co.	Jeffersonville, Ind.	37	3,580
Charles Ward Eng. Works	Charleston, W. Va.	12	1,835
Alabama Drydock & Shipbuilding Co.	Mobile, Ala.	7	1,014
Total 1927 launchings		**506**	**79,257**
Total 1926 launchings		**366**	**63,776**
Total 1925 launchings		**269**	**53,710**

show that the greatest strides have been made in recent years. From 1924 to 1927 traffic over the Ohio from Pittsburgh to Cairo, Ill., where it meets the Mississippi, increased from 10,866,682 tons to 20,128,518 tons. The Monongahela tonnage in that period rose from 21,878,815 tons to 25,873,029. The manner in which steel producers are turning to river transportation in reducing freight bills is seen from the fact that in the Pittsburgh district more steel tonnage moved over the Monongahela and Ohio rivers during the first ten months of 1928 than during the entire year 1927, formerly the record year. Figures for the Ohio and Monongahela to Dec. 1 were 1,091,520 and 1,161,760 tons, respectively, compared with 689,087 and 697,264 tons for all of 1927, and 266,074 and 216,138 for the 12 months of 1924.

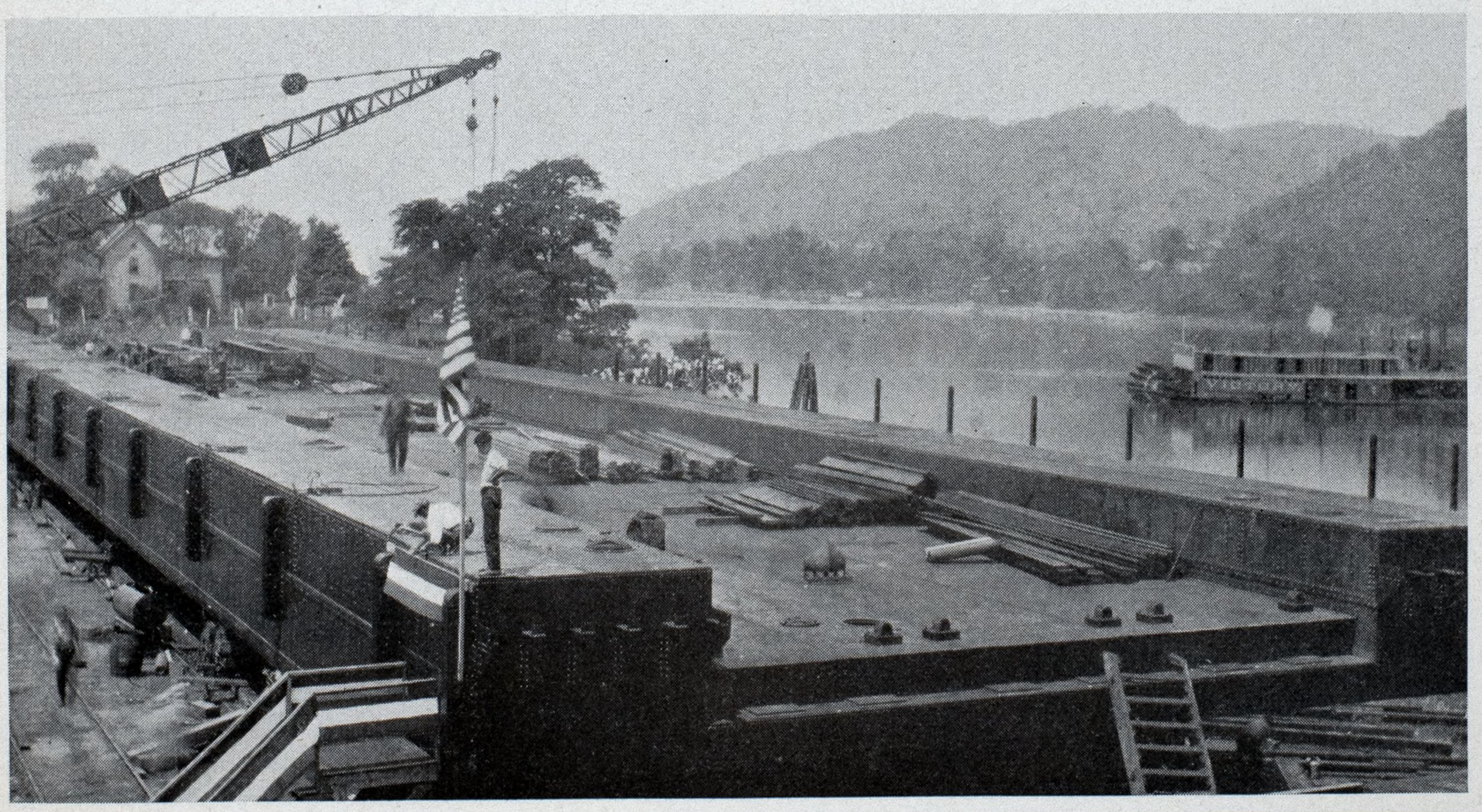
Coal is by far the most important commodity carried on the Ohio river system, accounting in previous years for more than 50 per cent of the total tonnage. Activity in oil and in steel products is increasing. Changes in the market geography of coal mines through the rise in importance of fields in western Kentucky and Alabama have served to restrict the growth of coal traffic, as also has the increased use of fuel oil, although the latter has become a more important commodity for water transportation. Tank barges have been in better demand recently, as oil companies turn to the rivers for cheap movement. Lower Ohio river points now received their coal from West Virginia, Kentucky and Southern Illinois and Indiana coal fields. Petroleum to a large extent has displaced coal for industrial fuel in the lower Mississippi valley, and also has lessened the demand at Gulf ports for bunker coal. The expansion in the consumption of electricity, however, indicates the construction of additional power plants and for centers near the Ohio river this stream provides an ideal location for the securing of water and cheap transportation for coal. Sand, gravel and coke are other important commodities carried, the aggregate of these, coal and iron and steel representing about 90 per cent of the total tonnage in 1927 over the Ohio from Pittsburgh to Cairo, Ill. This traffic is constantly growing in volume.

The capacity of both the Monongahela and Ohio rivers is estimated by the board of engineers for rivers and harbors, war department, at 30,000,000 tons each. In 1927, the streams carried 25,873,029 and 20,128,518 tons, respectively. As ample water is available additional locks can be provided, if commerce warrants, to take care of an enormous increase. The board estimates that more than 95 per cent of the total commerce on the Ohio river system is transported by private carriers. On the Monongahela river there are no common cariers, steel producers, coal and sand and gravel operators accounting largely for the traffic between the various plants on that busy waterway. The greater portion of the tonnage carried by steel mills consists of coal, although movement of finished products rapidly is growing.

The Carnegie Steel Co. inaugurated a river transportation service in 1917, primarily for the movement of coal and coke to its various plants. In that year the Carnegie company had one towboat and 21 steel barges. Today it has 14 towboats, 323 standard open-top barges, and 28 all-steel cargo barges, and one acid carrying

River Tonnage in All Products

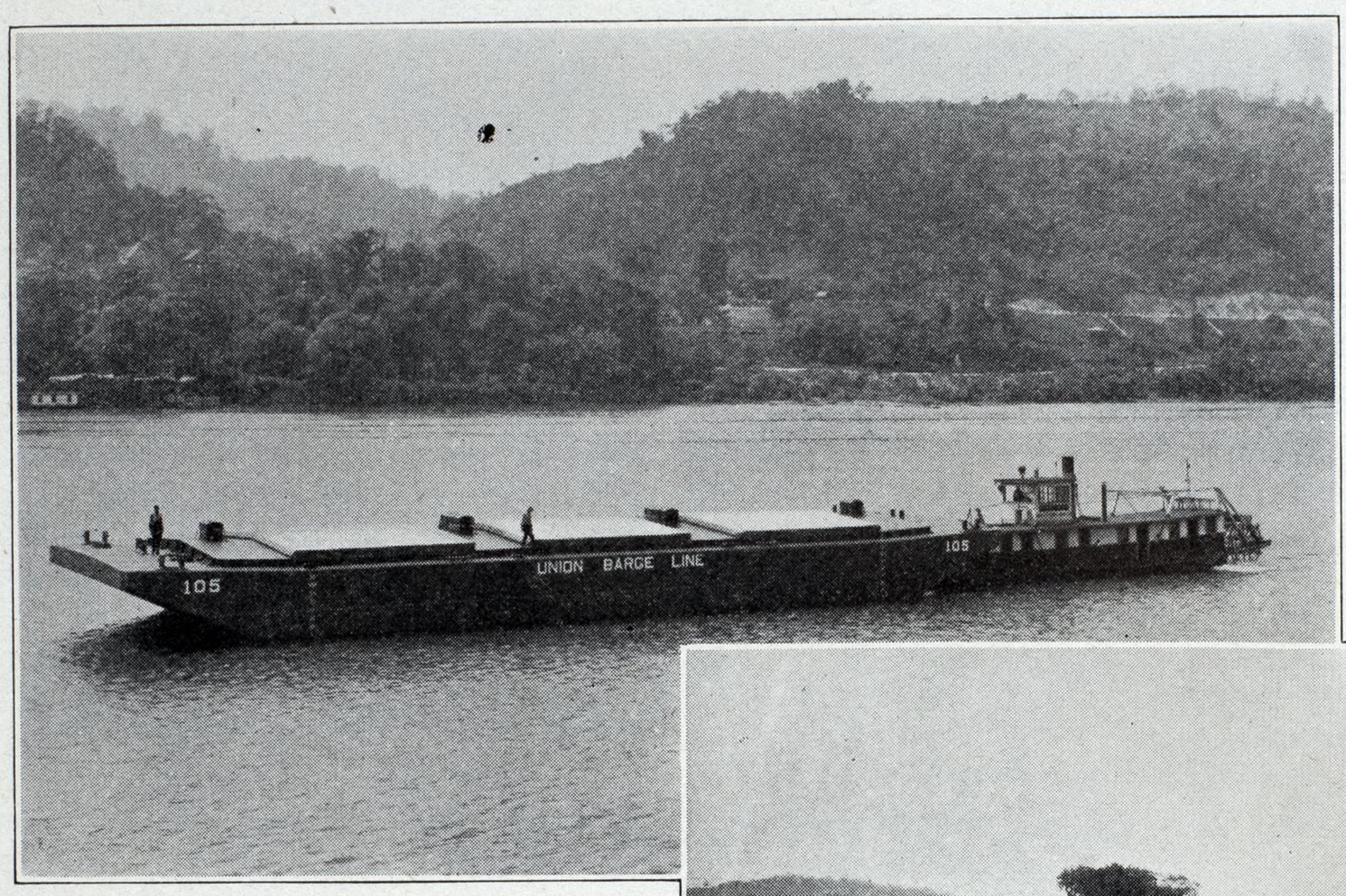
Year	Ohio (proper)	Monongahela	Allegheny	Total Ohio system (inc. other tributaries)
1918	6,171,413	16,537,746	2,436,048	28,015,534
1919	5,004,377	17,137,501	2,111,446	26,842,304
1920	9,382,464	24,264,354	5,084,200	41,917,748
1921	7,307,880	16,100,824	3,860,506	30,426,786
1922	6,291,826	14,407,661	4,015,640	27,689,142
1923	8,280,520	23,560,024	4,709,132	40,794,938
1924	10,866,683	21,878,815	4,428,039	40,665,545
1925	15,737,072	23,716,121	4,755,038	48.257,722
1926	19,754,978	26,374,682	3,716,779	54,426,472
1927	20,128,518	25,873,029	3,860,947	not known



Car Float for River Terminal at Memphis, Tenn. Built by Dravo Contracting Co. Designed by W. F. Schulz

barge. Shipments of steel and other commodities were started in 1913. The first tow of steel products for New Orleans left Pittsburgh in December, 1922. The Carnegie company also serves other units of the United States Steel Corp.

The Jones & Laughlin Steel Corp. was the leader in long-distance river transportation of steel products, in 1921 undertaking the experiment of sending a tow for delivery to customers in the West, South and Southwest. The success of this venture has resulted in its expansion into a



COVERED BARGE BUILT BY AMERICAN BRIDGE CO.

regularly organized private distribution facility.

Today, several steel companies, including the Wheeling Steel Corp., Pittsburgh Steel Co., and others regularly make use of the rivers in moving their products from mills to consumers, in addition to carrying raw material to their plants. A number of sand and gravel and coal companies also employ this cheap transportation medium on a large scale.

A Number of Common Carriers

On the Ohio river between Pittsburgh and Louisville there are a number of common carriers and several contract carriers. The majority of terminals located on the Ohio river system are privately owned. Terminals of private interests for the handling of coal, steel, sand and gravel have attained a high degree of efficiency. Package freight comprises only a small portion of the total commerce and for handling such freight most terminals consist of a sloping wharf. Some cities, however, are planning the construction of modern freight-handling terminals. Considerable expansion in this regard is anticipated with the completion of the current canalization project.

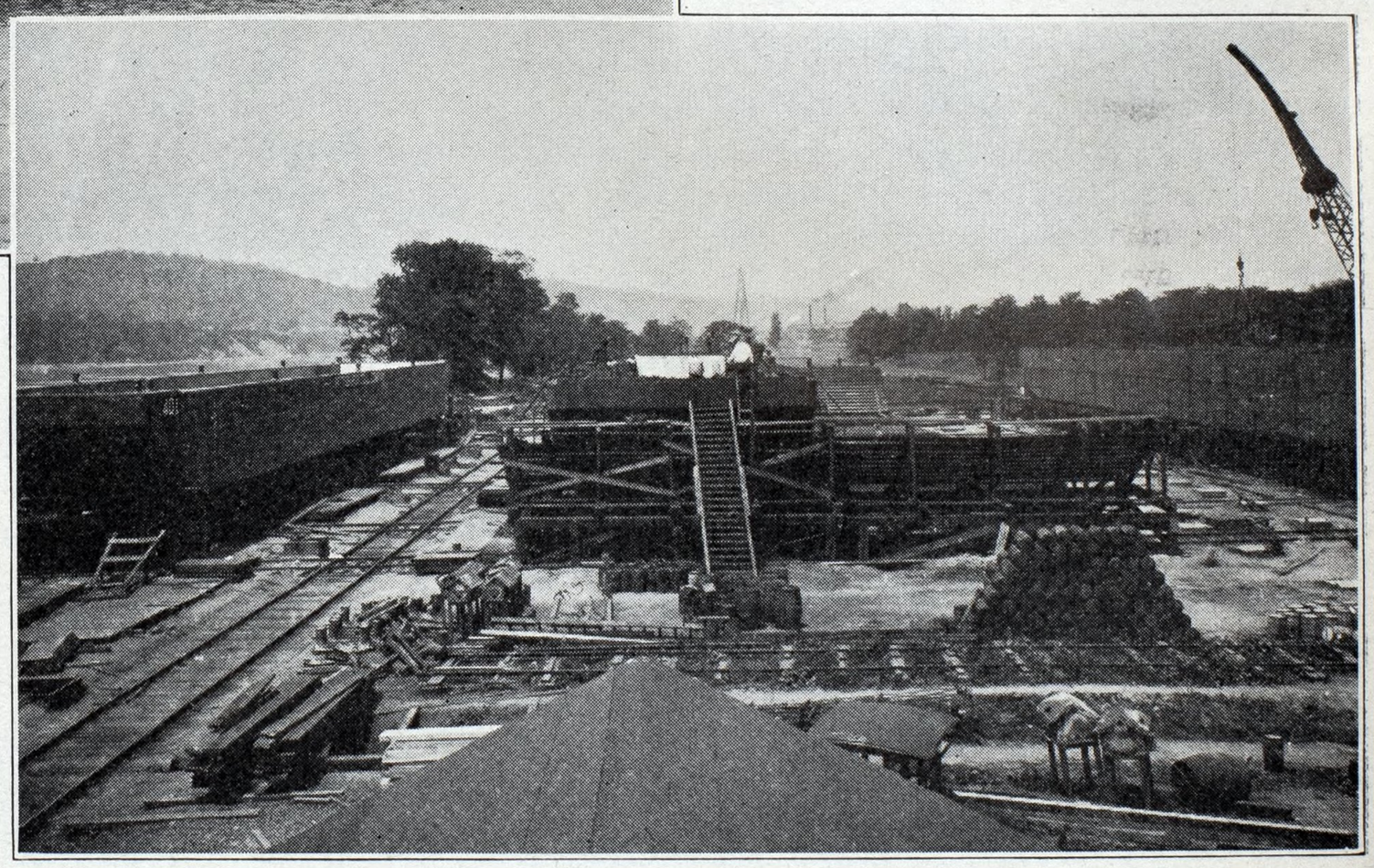
In an estimate of the saving effected on the Ohio river system during 1925 through use of river transportation rather than railroad facilities, the board of engineers for rivers and harbors, war department, reports a net saving of $11,387,120. This figure is arrived at after deducting fixed charges for the year of $9,157,-274 from gross savings, which is the difference between the actual cost of transporting the various commodities by water and what the cost would have been were they transported by rail. It is claimed that during the past 27 years the Monongahela river improvement has paid for itself and earned a surplus of almost $100,000,-000. The Ohio river in 1925, due to its uncompleted condition, showed a gross saving not quite equal to the annual fixed charges.

The average tow of coal, such as the Carnegie Steel Co. regularly moves from its mines to its Clairton by-products works, a distance of about 60 miles, is 5100 tons. Shipments of steel may run higher. The Jones & Laughlin Steel Corp. early in December started its seventy-first tow of steel products to Memphis with a load of 6500 tons. River conditions, to a certain extent, regulate this tonnage rather than available cargo.

Modern Floating Equipment

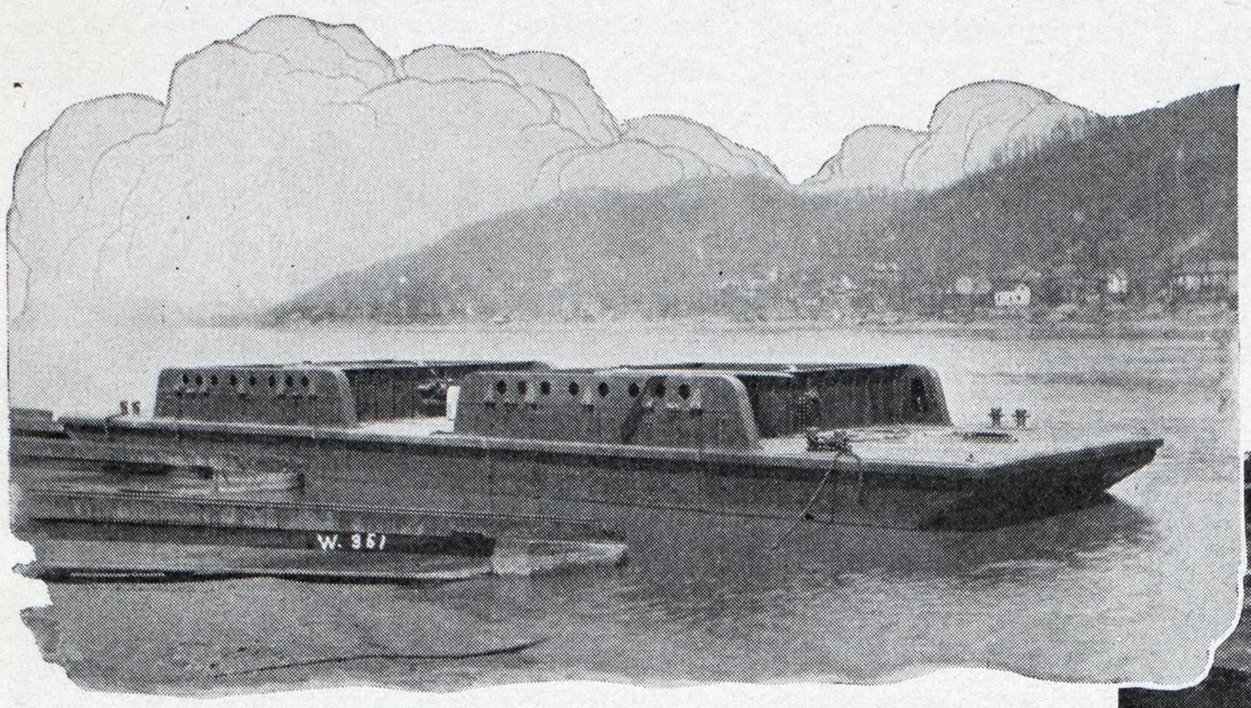
Construction of floating equipment has been fairly well standardized during the past few years, although changes since 1920 are marked. Prior to 1921 most barges were made of wood, but due to the increased cost of lumber and to the longer life and greater capacity of steel equipment, more and more barges are being constructed of steel. In 1927, ten builders launched 506 steel hulls for use on inland waterways. This compares with 366 in 1926 and 269 in 1925. Pittsburgh, because of its location at the head of the Ohio and easy access to steel supplies, is the center of river craft construction. In and near that city are located five of the largest builders of such equipment, including the following: American Bridge Co., Ambridge, Pa.; Dravo Contracting Co.; Jones & Laughlin Steel Corp.; Midland Barge Co., Midland, Pa.; Riter-Conley Co., Leetsdale, Pa. These five companies in 1927 launched 385 hulls, requiring 79,543 tons of steel, and representing an expenditure of $5,120,000.

Types of barges built today include car transfer, coal, sand, cargo, oil, acid-carrying barges, derrick hulls and dump scows. Special barges, such as for carrying molasses or hot tar, also have been built. The Dravo Contracting Co. at Neville Island, Pa., specializes in the construction of a wide variety of floating equipment, including whirler or



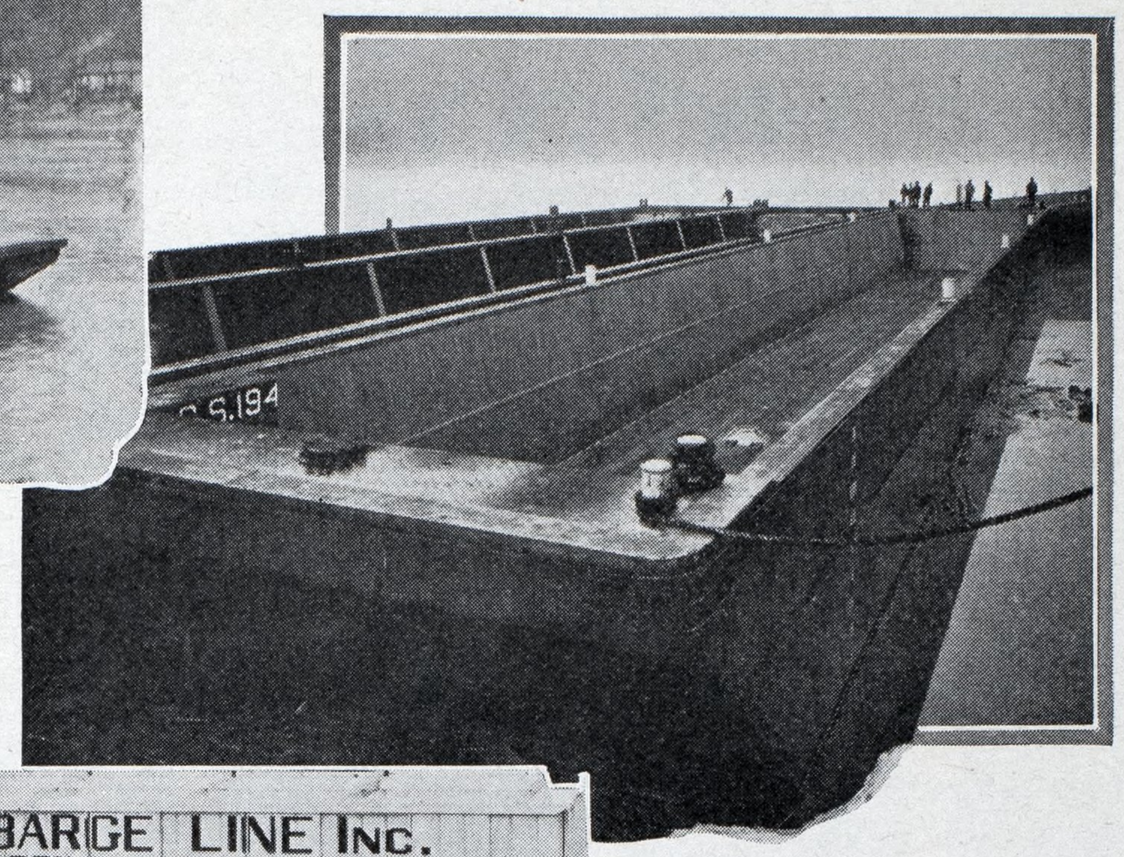
STANDARD COAL BARGE 175 X 26 X 11 FEET—BUILT BY RITER-CONLEY MFG. CO. FOR PITTSBURGH COAL CO—ON THE WAYS AT BUILDER'S YARD, LEETSDALE, PA.

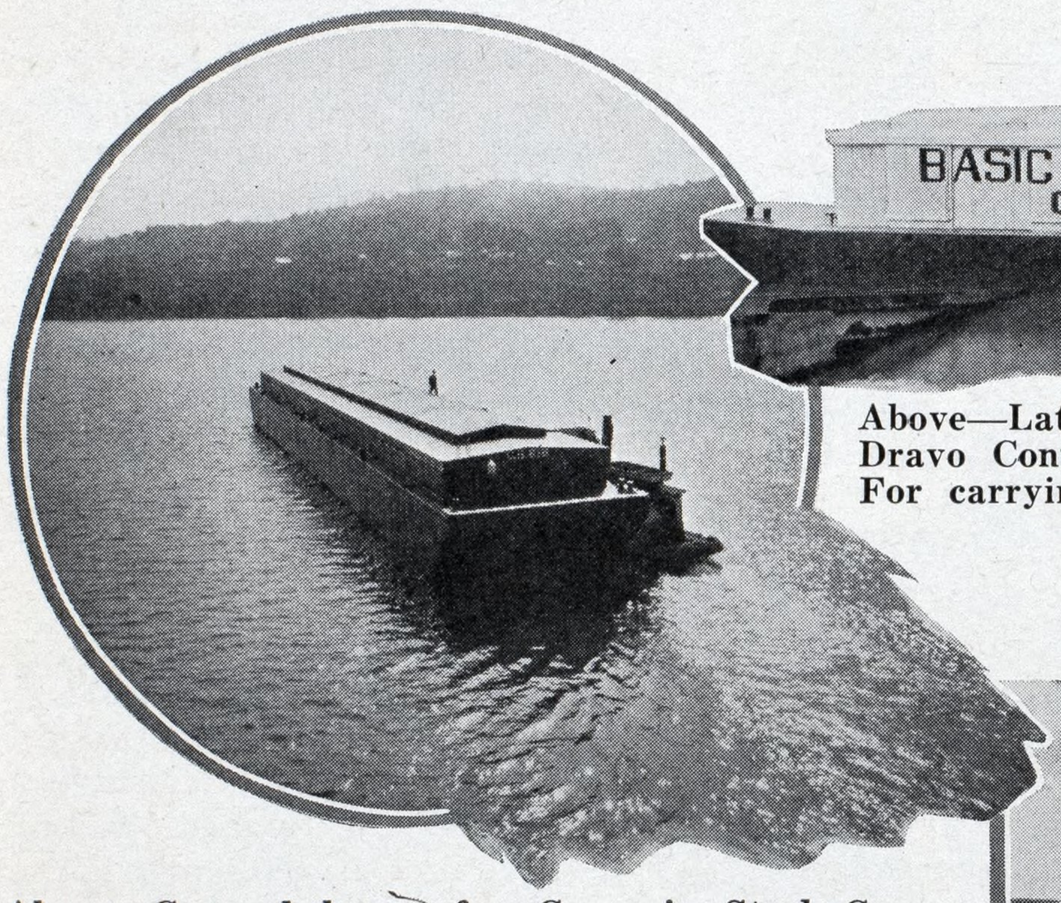
Modern Steel Hulls for River Trade

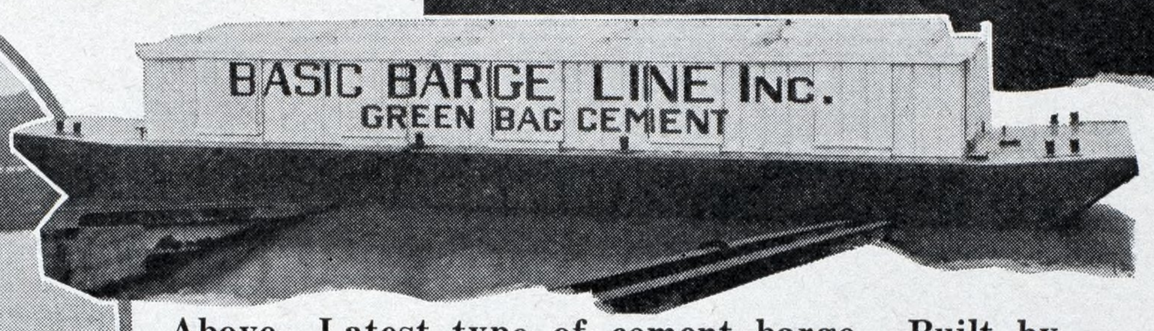


Above—Dump scow for United States Engineers—100 x 26 x 6 feet. Built by Dravo Contracting Co.

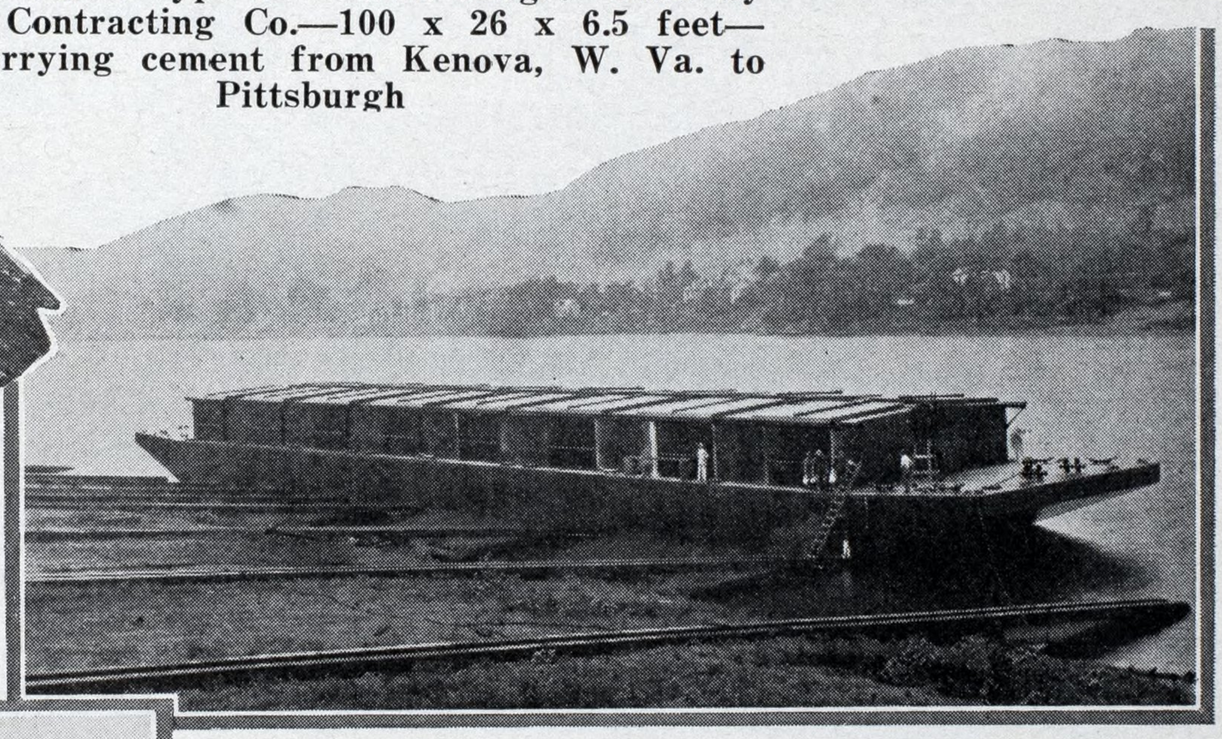
Below—Standard type of coal barge. Built by American Bridge Co.







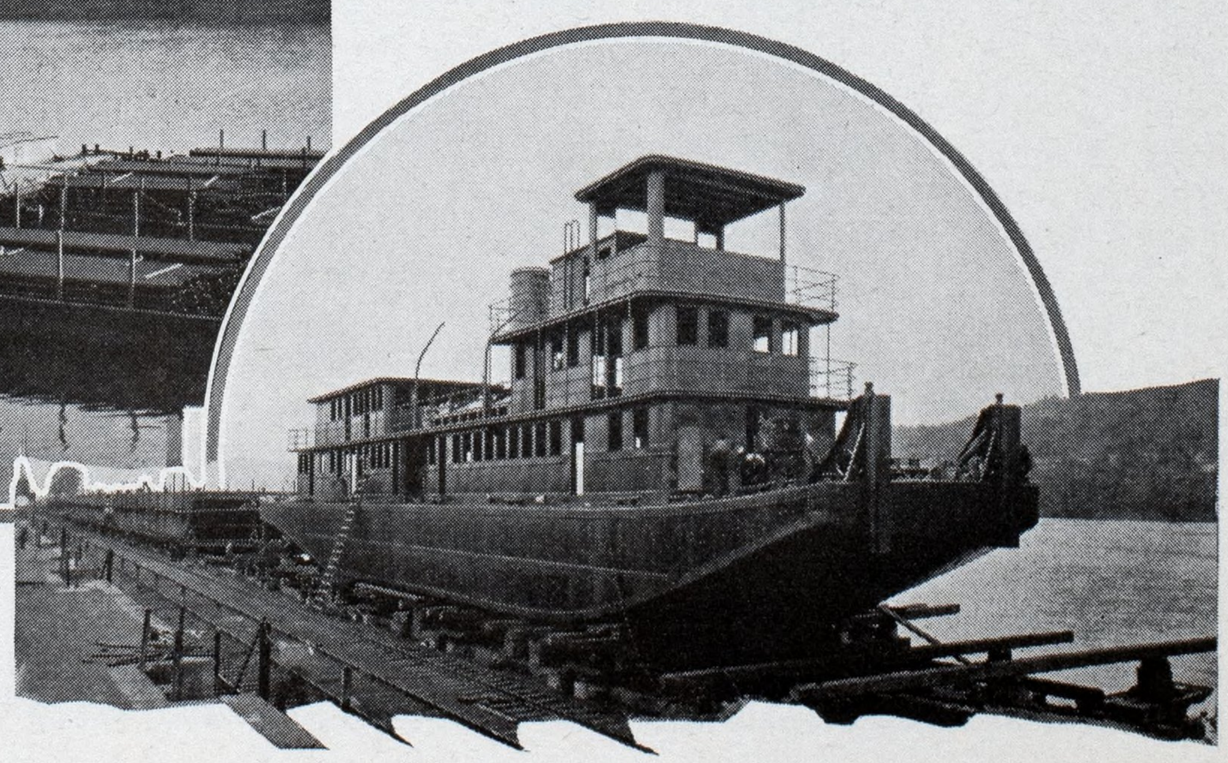
Above—Latest type of cement barge. Built by Dravo Contracting Co.—100 x 26 x 6.5 feet—For carrying cement from Kenova, W. Va. to Pittsburgh



Above—Covered barge for Carnegie Steel Co. for transporting steel products. Built by American Bridge Co.

Below—First all river shipment of steel products to Minneapolis, St. Paul

Above—Largest type of miscellaneous cargo barge in service on Inland waters. Built for use on Lower Mississippi on Federal Barge line by Dravo Contracting Co. Dimensions 230 x 45 x 11 feet



At Right—Twin screw tunnel stern 800 shaft horsepower diesel electric towboat for Tennessee Coal & Iron Railroad Co. Built by American Bridge Co.

revolving crane-boats, derrick-boats, floating cranes, lighters, mixer-boats, steam sand diggers, steam dredges, steam and diesel engine towboats. A recent development by this company is a cement barge, the unit being so designed as to permit of loading or unloading either through the hatches in the roof or through sliding doors across the deck.

An accompanying illustration shows a coal barge, developed by the American Bridge Co., in conjunction with river transportation companies, which is generally accepted as the standard 1000-ton barge for river service. The principal dimensions are length, 175 feet; beam, 26 feet; and depth, 11 feet. The carrying capacity is 1000 tons, equal to 25 freight cars, on a draft of 9 feet. The development of this barge has been gradual and began with the first coal barge built by the American Bridge Co. in 1904. The outstanding improvement was the introduction of the sloping steel hopper plates, which extend the entire length of cargo space and are framed into transverse watertight bulkheads which form the ends of the cargo packet. This eliminates the necessity of cross struts at the gunwhale, relieves the transverse floors from bending due to unbalanced side pressure, increases the longitudinal strength and does away with the twisting in the barge through unsymmetrical loadings.

Build More Covered Barges

There has been a large gain in recent years in demand for barges used in carrying cargo that must be protected. This type of craft is built either to carry the cargo in its hold or on deck protected by a housing. Special barges have been built with a capacity of more than 2000 tons. The Mississippi-Warrior Barge line has developed for operation between New Orleans, Cairo and St. Louis, special steel barges for general cargo with a capacity up to 2000 tons and twin-screw tunnel type towboats of 2000 horsepower.

Some barge builders assemble their crafts on ways built parallel to the river on which their plants are located. The Riter-Conley Co. at Leetsdale, Pa., has five barge ways and launching skids on the banks of the Ohio. Three barges usually are undergoing construction simultaneously on one or more of the ways. When a barge nears the final stage of completion, it is moved on the launching skids; the two under erection are moved in turn toward the river provide room on the skribbing for the construction of a third vessel.

Discussing the future of river transportation recently before the twenty-fourth National Rivers and Harbors congress, Secretary of War Davis predicted that freight demands of American commerce in the future would exceed the capacities of railways, automobile highways and airways to transport it. Secretary Davis said the achievements toward developments of waterways in the past four years never had been approached before during 100 years of federal responsibility and forecast further development in the country's inland water transportation system.

The outlook for river craft construction is regarded as bright. The Federal Barge line will be in the market for equipment to cost about $10,000,000, which it is planned will result in a three-year building program. The American Barge line, operating boats between Pittsburgh and New Orleans is planning to spend $1,000,000 in the near future for floating equipment, with another $500,000 for terminal improvements. In addition, a number of independent concerns are scheduled to be in the market early this year.

Diesel Electric Tanker for Tidewater Oil Co.

A new coastwise, diesel electric tanker under construction for the Tidewater Oil Co. will carry gasoline and lubricating oil. Her capacity will be approximately 20,000 barrels of gasoline and approximately 55,000 gallons of lubricating oil, the latter to be carried in individual tanks in the forward hold space. Her route will be between the limits of Portland and Hampton Roads. She will carry a crew of 18 men.

The hull will be constructed on the Isherwood system and is being built and equipped by the Pusey & Jones Corp., Wilmington, Del. The vessel will have a length of 255 feet, a beam of 44 feet, a draft of approximately 15 feet 6 inches and a deadweight of about 2400 tons. The diesel engines will be built by I. P. Morris & De La Vergne Inc.

The power plant will consist of two 6-cylinder, non-reversible, heavy duty, solid injection oil engines rated 625 shaft horsepower at 225 revolutions per minute. Each engine will be direct connected to a direct current generator rated 410 kilowatts, at 225 revolutions per minute, 250 volts, shunt wound. The generators and other electric equipment will be furnished by the General Electric Co.

In addition to the two main generators there will also be three auxiliary generators, each rated 45 kilowatts, 240 volts, compound wound. Two of these generators will be mounted on shaft extensions of the main generators, and the third will be direct connected to a 3-cylinder, solid injection, Winton engine. These three generators will furnish power for excitation and also for lighting and the operation of auxiliaries.

The propulsion motor will be a double unit machine rated 1000 shaft horsepower, at 130 revolutions per minute, and 500 volts. It will consist of two 500 horsepower, 130 revolutions per minute, 250-volt motors mounted on a common shaft with two bearings and base.

Propulsion control will consist of the variable voltage (Ward Leonard) system, and will be arranged for operation from both the engine room and the pilot house. The propulsion control switchboard will be located in the engine room and will be of the dead-front type. A live-front type of switchboard for the auxiliary generators and lighting and power distribution circuits will also be located in the engine room.

The electrified auxiliaries will include two main cargo pumps rated at 75 horsepower each; two lubricating oil cargo pumps rated at 15 horsepower each; a number of other pumps, and deck and other auxiliaries, the whole having an aggregate rating of 210 horsepower. The steering gear, capstan, anchor windlass, winches and whistle will be of Allan Cunningham manufacture. Cooking and heating will be done electrically, although a steam boiler will be installed.

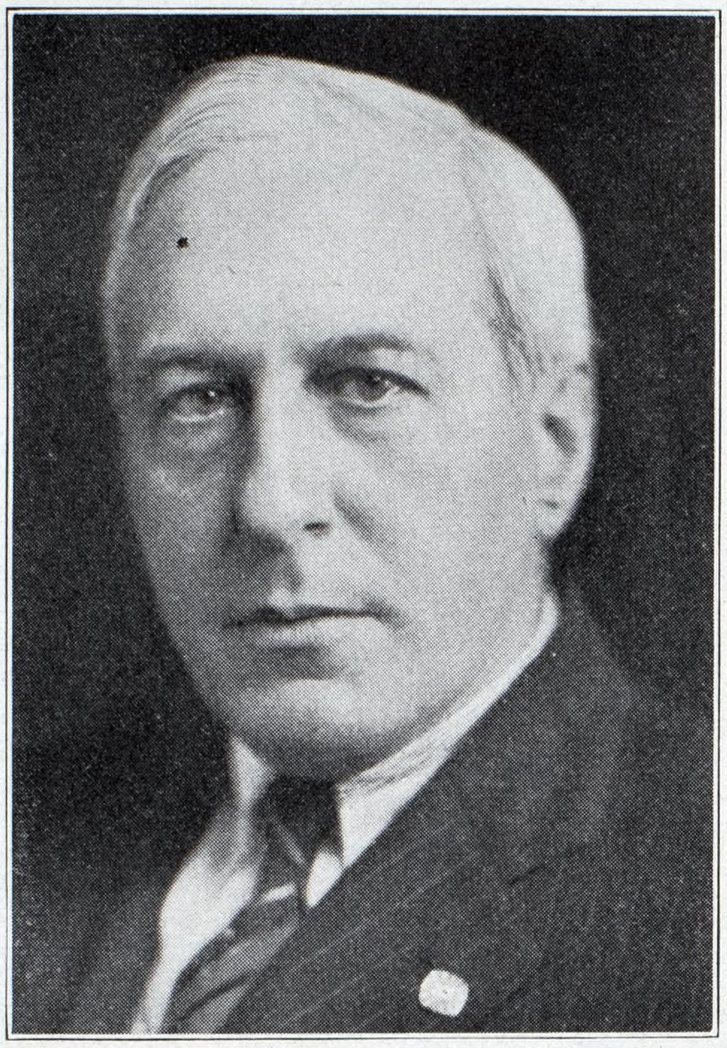
Nine Vessels Are Sold by Shipping Board

An offer by Robert W. Malone on behalf of a new corporation to be formed with New York and Boston associates for the steamers JOHN JAY, JAMES OTIS and TERRE HAUTE was accepted by the shipping board Jan. 17. The new corporation proposes to operate tramp ships exclusively and as soon as the vessels purchased are ready to go on berth they will be placed in the tramp service.

For the JOHN JAY the purchaser pays $55,000; for the JAMES OTIS, $60,000; and for the TERRE HAUTE, $35,000. Terms of the sale are 10 per cent cash and the balance in ten equal installments. The JOHN JAY and the JAMES OTIS, being of 12,850 deadweight tons each, are among the

(*Continued on Page* 60)

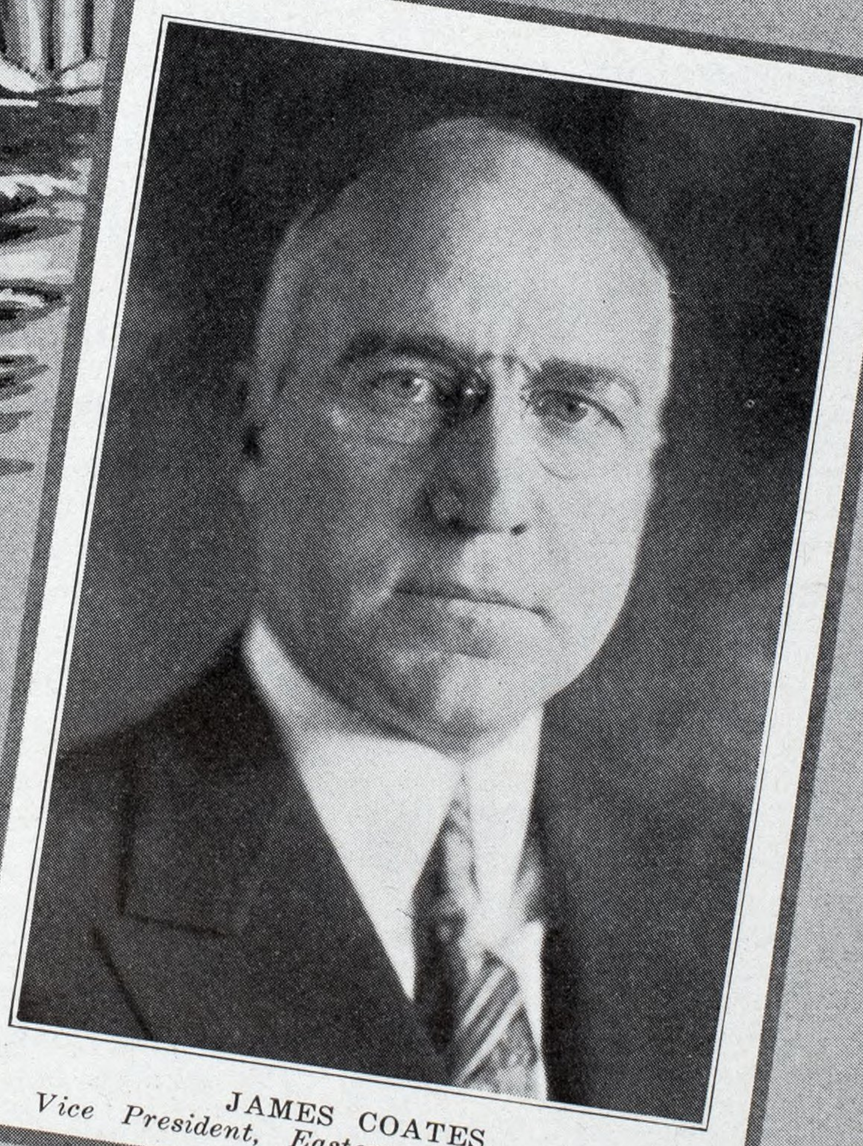
MEN of MARINE AFFAIRS



W. H. McGEAN
Vice President, C. L. Hutchinson & Co.

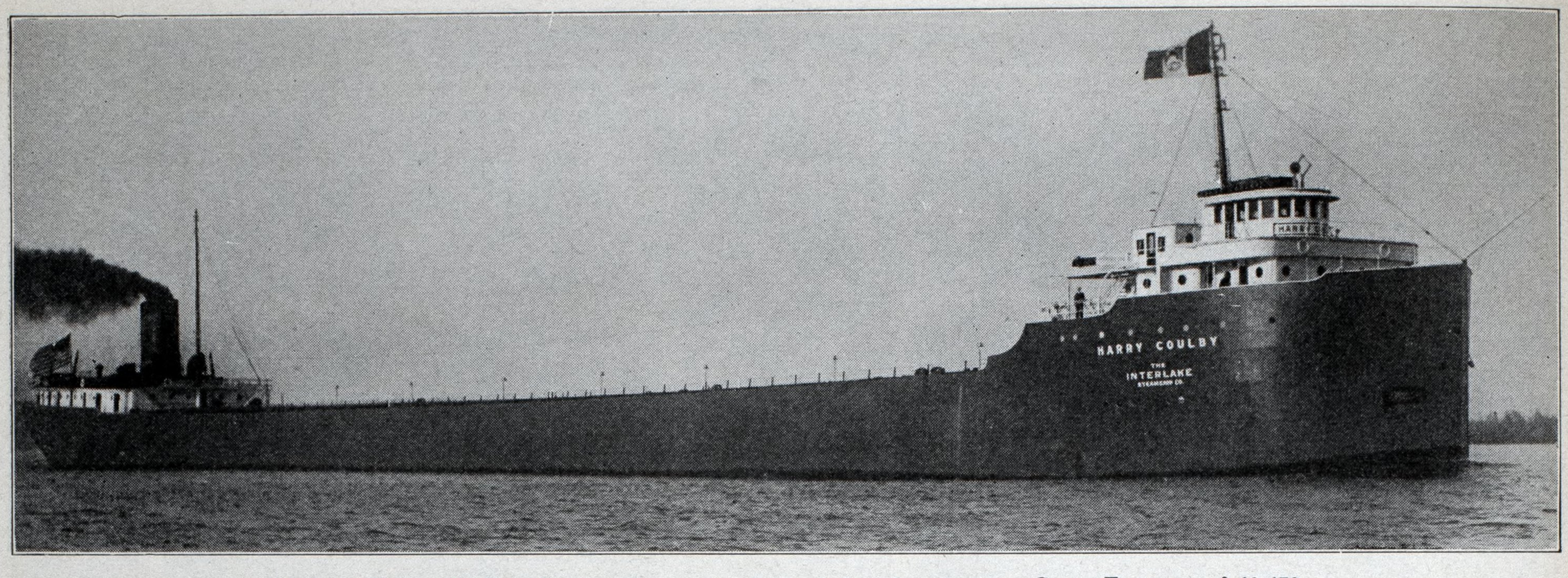
A. E. R. SCHNEIDER
Manager, Cleveland Cliffs Steamship Co.

PAUL JAHNCKE
Jahncke Dry Docks Co. Inc.



JAMES COATES
Vice President, Eastern Steamship Lines

Photos by Blank-Stoller, Inc.



Steamer Harry Coulby—Largest American Great Lakes Ore Carrier—Gross Tonnage of 10,179

Load Trials of a Bulk Freighter

S. S. Harry Coulby Shows Low Cost Per Ton-Mile Under Actual Service Conditions—Larger Capacity and Better Speed

By A. H. Jansson

UNDER certain circumstances and within limits the cost per ton for carrying cargo becomes less as the size of the vessel increases. Operators on the Great Lakes have been fully aware of this fundamental principle and for many years the 600-foot bulk cargo carrier has been looked upon as a standard type for maximum efficiency. Anything smaller than this would not be considered. The tendency has been here and there on the part of the more progressive operator to go to even larger sizes.

Early in 1927 the American Ship Building Co. completed two 600-foot bulk cargo carriers for the Interlake Steamship Co., owned by Pickands, Mather & Co., Cleveland. These vessels were named the WILLIAM MCLAUCHLAN and ROBERT HOBSON. While they were being delivered the American Ship Building Co. launched for the same owner the largest American ore carrier on the Great Lakes, the S. S. HARRY COULBY. This vessel is 630 feet, 9 inches in length over all and is 65 feet in beam. She can carry 2000 tons more than the standard 600-footer. The HARRY COULBY entered service on Sept. 10, 1927, with a cargo of 14,650 tons of coal out of Lorain, O., for the upper lakes. Throughout the remainder of the season of 1927 and all of the season of 1928 this vessel gave particularly satisfactory service.

Carries 2000 Tons More Cargo

Having mentioned the ROBERT HOBSON above as a standard 600-foot freighter, it is interesting to note a comparison in carrying capacity of iron ore between this vessel and the HARRY COULBY. An average of seven trips with iron ore, from actual figures, shows that the HOBSON carried 11,516 tons while the COULBY carried 13,539 tons, or 1969 tons more per trip for the COULBY. It is also interesting to know that pounds of coal burned per hour will not vary appreciably as between the two ships and further that the COULBY with 2000 tons greater cargo actually does perhaps a half a mile per hour better in speed than the HOBSON. Efficiency and despatch have marked the service of the HARRY COULBY. One of her records is the unloading of 13,650 tons of ore within a period of six hours from the time she passed the

Full Load Tests of Lake Bulk Cargo Carrier Harry Coulby

TEST NO. 1	
Duration in hours	6
Time	Oct. 4, 1928, 7 a. m. to 1 p. m.
Place	Lake Huron
Cargo, coal tons (abt.)	15,000
Draft	
Forward, feet, inches	19—7
Aft, feet, inches	19—11
Mean, feet, inches	19—9
Displacement, tons (2000 lbs.)	21,200
Average I. H. P.	2,406.7
Average R. P. M.	87.6
Speed, miles per hour	12.5
Propeller slip, per cent	14.72
Average steam pressure, lbs	208
Average superheat, degrees	41.9
Average Temp. feed, degrees	233.7
Coal—Total pounds used	26,065
Coal—Pounds per hour	4,344
Coal—Pounds burned per square foot of grate surface	22.28
Coal—Pounds per I. H. P. per hour	1.77
B.t.u per pound of coal	13,820

TEST NO. 2	
Duration in hours	4
Time	Oct. 5, 1928, 7 a. m. to 11 a. m.
Place	Lake Michigan
Cargo, coal, tons (abt.)	15,000
Draft	
Forward, feet, inches	19—7
Aft, feet, inches	19—11
Mean, feet, inches	19—9
Displacement—Tons (2,000 lbs.)	21,200
Average I. H. P.	2,268.9
Average R. P. M.	84.9
Speed, miles per hour	11.3
Propeller slip, per cent	20.67
Average steam pressure, pounds	212.5
Average superheat, degrees	51.2
Average Temp. feed, degrees	231.8
Coal—Total pounds used	15,550
Coal—Pounds per hour	3,887
Coal—Pounds burned per square foot of grate surface	20
Coal—Pounds per I. H. P. per hour	1.71
B.t.u. per pound of coal	13,140

TEST NO. 3	
Duration in hours	4
Time	Oct. 5, 1928, 1:30 p. m. to 5:30 p. m.
Place	Lake Michigan
Cargo, coal, tons (abt.)	15,000
Draft	
Forward, feet, inches	19—7
Aft, feet, inches	19—11
Mean, feet, inches	19—9
Displacement, tons (2,000 lbs.)	21,200
Average I. H. P.	2,401.47
Average R. P. M.	86.4
Speed, miles per hour	12.3
Propeller slip, per cent	15.1
Average steam pressure, pounds	211.3
Average superheat, degrees	54.8
Average Temp. feed, degrees	233
Coal—Total pounds used	17,250
Coal—Pounds per hour	4,312.5
Coal—Pounds burned per square foot of grate surface	22.1
Coal—Pounds per I. H. P. per hour	1.75
B.t.u per pound of coal	13,140

S. S. Harry Coulby—Hull, Machinery and Equipment Particulars

General Data

Length over all, feet, inches ..... 630—9
Length between p.p., feet, inches.... 607—0
Breadth molded, feet, inches ..... 65—0
Depth molded, feet, inches ..... 33—0
Draft, mean on test, feet, inches..... 19—9
Displacement, at draft, short tons 21,200

Main Engine

One—Vertical triple expansion.
Size—25½ x 41 x 67 inches x 42-inch stroke. L.P. cyl. forward. H.P. cyl. center. I.P. cyl. aft. Stephenson valve gear of overhung type. I.P. and L.P. valves—double ported slide. H.P. valve of piston type. I.P. and L.P. valves have assistant cylinders. All cylinders have steam jackets in top and bottom heads. H.P. cyl. has steam jacketed liner.
Bilge and Cooler Pumps—Attached.
Thrust Bearing—Seven thrust collars water cooled. Forced lubrication supplied by two 4½ x 2¾ x 4-inch duplex oil pumps. One pump as stand by.
Propeller—One, 4 blades, cast steel, 15 feet 3 inches in diameter; 14 feet 9 inches in pitch. Cast pitch 14 feet. Developed area 80.25 square feet.

Boilers

Three Babcock & Wilcox boilers at 215 pounds working pressure. Built in superheaters designed for 50 degrees Fahr. superheat. Total heating surface 9345 square feet. Superheating surface, 750 square feet. Grate surface, 191 square feet. Ratio heating surface to grate surface 54.16 to 1.
Induced Draft—Fan of 8 feet diameter driven by a double 6 x 5-inch steam engine. Built by American Ship Building Co.
Smoke Stack—Inside diameter 8 feet. Ratio stack to grate surface, 3.799 to 1.
Flue Blowers—Diamond Marine type.
Feed Water Heater—Reilly, two pass. marine type. Capacity 53,000 pounds per hour feed water from 130 to 215 degrees Fahr. with 4 pounds back pressure.
Grease Extractor—Audale duplex, fitted in feed line.
Condenser—Wheeler, cylindrical, horizontal, 2700 square feet cooling surface. Two-pass type.
Two Air Pumps—Wheeler steam jets.
One Condensate Pump—Union, 7½ x 7½ x 6 inches, horizontal duplex.
One Circulating Water Pump—Morris Centrifugal, 12-inch diameter discharge, direct connected to a 9 x 9-inch single cylinder vertical steam engine. Capacity 2800 g.p.m. at 270-300 r.p.m.

Engine Room Auxiliaries

One Main Feed Pump—H.S. 14 x 8½ x 16.
One Aux. Feed Pump—H.D. 12 x 6 x 12.
Two Ballast Pumps—15-inch centrifugal. Direct driven by an 8-14 x 10-inch vertical steam engine.
Two Aux. Ballast Pumps—V.D. 10 x 14 x 16.
One Mates Pump—H.D. 7½ x 5 x 10.
One Sanitary Pump—V.D. 7½ x 5 x 10.
One Lift Pump—H.D. 4½ x 3¾ x 4.
One Drink. Water Pump—H.D. 3 x 2 x 3.
One Cool. Water Pump—H.D. 5¼ x 4¾ x 5.
Two Lub. Oil Pumps H. D. 4½ x 2¾ x 4.
Two Generators—D.C. 25 K.W. direct driven by 9 x 8-inch single cylinder vertical steam engine.
One Generator—D.C. 10 K.W. direct driven by 6 x 6-inch single cylinder vertical steam engine.

Deck Machinery

Six mooring winches, ins.....9 x 10
Two hatch engines, ins. .....6 x 6
One windlass, ins. .....10 x 10
One steering engine, ins. .....9 x 9

Drinking Water System

One Griscom-Russell distilling apparatus, consisting of evaporator-distiller and filter. Capacity, 55 gallons per hour. Also a 1000-gallon drinking water tank on aft deck house roof and a 2000-gallon tank in windlass room forward. Tanks supplied by a 3 x 2 x 3-inch pump.

Feed and Filter Tank

Steel tank on main deck stringer. Tank receives discharge from condensate pump and from all traps discharging clean water. Dirty drains discharge to a settling tank on lower engine room floor. A lift pump draws from drain tank and discharges to filter tank.

Sanitary System

Complete hot and cold water system throughout ship. Two hot water tanks, one forward and one aft. Two 6000-gallon fresh water tanks located in dark hold forward. Entire system served by a vertical duplex sanitary pump in engine room.

Note: Figures noted opposite pumps are in inches. H.D. means horizontal duplex and V.D. means vertical duplex.

lighthouse, entering Ashtabula, O. harbor and passing the same light outward bound in light condition.

On a 20-foot draft the HARRY COULBY will make 12½ miles an hour with the engine developing 2500 indicated horsepower. At full power her engine is capable of developing over 3600 indicated horsepower. In design this engine is similar to that for the standard lake cargo vessel except that the cylinder heads at top and bottom are steam jacketed and the finish is unusually elaborate. The boilers of the COULBY, three in number, hand-fired coal burning, are of the watertube type. No cargo vessel on the Great Lakes can compare with her in the spaciousness and luxury of the finish and furnishings of her owner's and guest accommodations. These quarters are equal to those of the finest ocean-going yacht. A complete and fully illustrated description of this fine vessel appears in MARINE REVIEW for October, 1927.

Tests Under Service Conditions

The actual performance of this, the largest ore carrier on the Great Lakes is a matter of very direct interest to marine engineers and particularly to lake vessel operators. The Pickands, Mather Co. is, therefore, to be commended for co-operating with the engineers of the American Ship Building Co. in the conduct of trials of the HARRY COULBY under full load and actual service conditions. Three tests were conducted during a voyage from Toledo, O., with a cargo of about 15,000 tons of coal to Indiana Harbor, Ill., Oct. 3 to 6, 1928. The first test was of six hours' duration on Oct. 4; and tests Nos. 2 and 3 were each of four hours' duration and were both run on the same day, Oct. 5. These trials, a resumé of the results of which are noted in the accompanying tables, were conducted by E. G. Turner, assistant chief engineer of the American Ship Building Co., and William E. Fetting, assistant chief engineer for the Interlake Steamship Co., representing Charles E. Collins, chief engineer of the fleet.

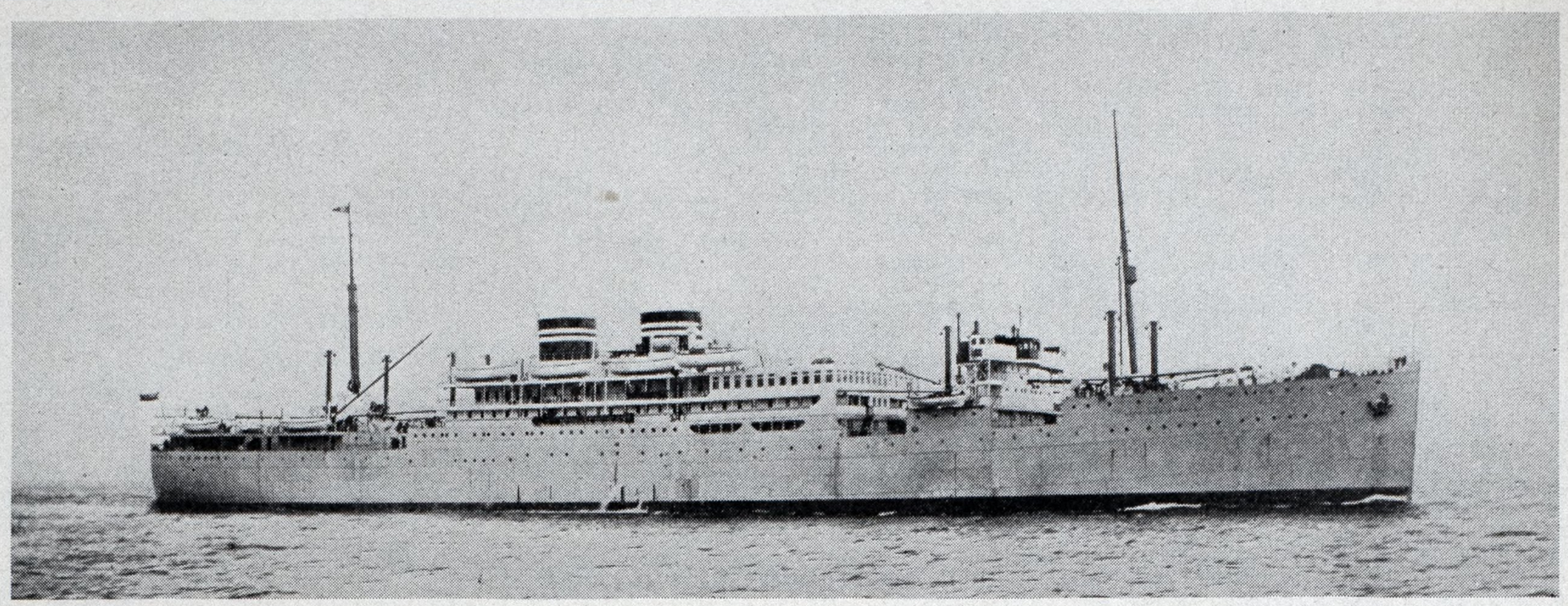
In considering the overall efficiency of any vessel the amount of fuel per mile per ton of displacement is one of the basic indicators of performance. The tests show that it takes only .0159 pounds of coal per mile per ton of displacement in the case of the COULBY whereas in other well-known recent bulk cargo carriers of large size the corresponding figure would be about 10 per cent higher.

For convenience all the principal particulars of the S. S. HARRY COULBY, her machinery and equipment, is arranged in tabular form. The results of the tests are also so arranged.

Turbine Electric Ships Are Ordered by Ward Line

Two new electric liners to be built for the Ward line of the New York and Cuba Mail Steamship Co. by the Newport News Shipbuilding & Dry Dock Co., will be, when completed, the fastest turbine electric passenger ships built. Designed for a speed of 20 knots, they will reduce the New York-Havana run from 72 to less than 60 hours, the fastest time ever maintained by a liner in this service. The bid was $4,350,000 per ship.

The new liners were designed by Theordore E. Ferris, New York naval architect. Each will be a twin-screw vessel of 15,830 gross tons with an overall length of 508 feet, a beam of 69 feet 8 inches and a draft of 26 feet. There will be seven decks, four for passenger and crew space and the remainder for cargo. Each ship will have accommodations for 468 passengers, of which 378 will be first class. Regulations made by the London conference for safety of life at sea will be rigidly followed.



Twin Screw M. S. Highland Monarch, 14,137 Gross Tons. Service Speed 15 Knots. Built by Harland & Wolff, Ltd.

British Shipyards Receive Orders as Shipping Outlook Improves

By Vincent Delport
European Manager of Marine Review

ORDERS for new ships have been coming in steadily during the last three months of 1928, bringing a welcome change to the position of the shipyards as it appeared at the end of the summer. Thus the shipbuilders of Britain and Ireland are entering the new year with a substantial number of new contracts on their books. The Clyde has been especially favored. The shipbuilding industry, however, is still a long way from enjoying stable and prosperous conditions. Three months ago 60 per cent of the berths were vacant, and the new business is not sufficient to give work to all. From the standpoint of employment, the situation is, in fact, less favorable than a year ago, the number of unemployed shipyard workers at the end of 1928 being 60,000, as compared with 47,000 at the end of 1927. The present price level for new construction is also unsatisfactory to the builders, and often brings little or no profit. Lord Invernairn of Strathnairn, chairman of William Beardmore & Co. Ltd., stated at a recent launching that shipbuilding prices had touched rock-bottom level, and that the present tendency is toward a rise.

Possibly the low price level now prevailing has been an incentive to owners to place their orders. There is a danger, however, that orders may be placed in excess of the actual needs of the shipping industry, which already suffers from surplus tonnage. It also is apparent that there is an excess of building capacity in Great Britain. The leading shipbuilding concerns largely expanded their yards during the war. Shipping has not itself expanded as it was expected to do, while competition in shipbuilding from foreign yards is far more intense than it was in previous years.

Modern General Cargo Boats

During the past year there has been a tendency to order modern general cargo boats, and several owners have placed contracts for groups of such vessels, from two to six. Another characteristic of the year has been the continued favor shown for large ships; in fact, the White Star liner now building at the yard of Harland & Wolff Ltd., at Belfast, is to be 1000 feet in length and will exceed in size all previous vessels. Special facilities will have to be provided at the terminal ports to accommodate this liner. It has been stated by Lord Kylsant, chairman of the White Star line, that the new vessel will be electrically driven. This decision no doubt has been confirmed by the successful operation of the CALIFORNIA, and the example set in building the VIRGINIA and of the VICEROY OF INDIA. It is believed that the power will be generated by steam turbines, and that the new liner will be ready in time for the 1931 season. Another large vessel ordered in 1928 is the EMPRESS OF BRITAIN, of 40,000 gross tons. The fact that large new liners also have been contracted for in Germany, France and Italy further indicates that large ships still are looked upon as a profitable venture by transatlantic companies.

The principal shipbuilding district in Great Britain is along the river Clyde. It extends for several miles outside Glasgow. During 1928 the Clyde launchings were 229 vessels of 601,918 gross tons, as compared with 274 vessels of 462,510 tons in 1927. The 1928 results are the best since 1920. The Canadian Pacific company has placed valuable contracts with Clyde shipbuilders. One of the most recent is for the EMPRESS OF BRITAIN, a liner of 40,000 tons intended for service between Southampton and Quebec. The order was

placed with John Brown & Co. Ltd., of Clydebank, and the vessel must be completed by the spring of 1931. This will be the company's largest vessel, the length being 730 feet, the breadth 97 feet. The speed will be 24 knots. The vessel will be driven by steam turbines; she will have four propellers and four sets of high-pressure single-reduction geared turbines, obtaining steam from nine oil-fired watertube boilers of the Yarrow type, having a maximum pressure of 375 pounds with a steam temperature of 700 degrees Fahr. This contract is the most important single order received on the Clyde since the AQUITANIA was built for the Cunard company about 16 years ago.

A Tendency to Large Liners

John Brown & Co. Ltd., is also completing for the Canadian Pacific company two 20,000-ton liners, of the duchess series, the DUCHESS OF RICHMOND and the DUCHESS OF YORK, while the Fairfield company, at Govan, Glasgow, has laid down the keel of the EMPRESS OF JAPAN, of 25,000 tons. The same builder has just received an order for two passenger steamers for the Canadian Pacific company's night service between Victoria, on Vancouver Island, and Vancouver City. Each ship will be 365 feet in length, 52 feet in breadth and 19 feet in depth. There will be accommodation for 435 passengers at night, and for 1500 in the daytime.

Alexander Stephen & Sons, of Linthouse, is to build a ship of about 9000 tons deadweight for the firm of Mclay and McIntyre, of Glasgow; they also will build the engines. John Brown & Co. Ltd., is building three vessels for the New Zealand Shipping Co. The first to be completed will be the RANGITIKI, of 17,500 gross tons, which now is being fitted out. The machinery consists of two Brown-Sulzer five-cylinder engines, each developing between 4000 and 5000 shaft horsepower. Lithgows Ltd., of Port Glasgow, is to build three cargo steamers of 9000 tons deadweight for a Liverpool firm; the engines will be supplied by David Rowan & Co., of Glasgow. The Blythswood Shipbuilding Co., of Scotstoun, has launched the motor tanker IRANIA, of 2500 gross tons and 1400 horsepower which will be propelled by the first all-British marine internal combustion engine made by Richardson, Westgarth & Co., of Hartlepool. The engine is of the double acting, two-stroke type, with three cylinders, and has a new system of fuel injection which simplifies supervision. The Donaldson line has ordered two cargo steamers of 9500 tons deadweight from Lithgows Ltd., Port Glasgow. The Fairfield Shipbuilding & Engineering Co. Ltd., launched the motorship STAFFORDSHIRE, of about 10,800 tons, for the Bibby line. One Port Glasgow shipyard, the Clyde Shipbuilding & Engineering Co. Ltd., is being wound up.

Tyneside Shipbuilders are Busy

The Tyneside shipbuilders, on the North-East coast, launched in 1928 72 vessels of 323,768 tons, as against 62 vessels of 329,366 tons in 1927. The three firms responsible for the largest tonnage are: Swan, Hunter and Wigham Richardson, with 112,261 tons, Armstrong-Whitworth, with 61,641 tons, and Palmer's Shipbuilding & Iron Co., with 48,906 tons. Recently, Swan, Hunter's has received a number of contracts for Canadian Lake steamers. Readhead & Sons Ltd., of South Shields, have obtained a contract for three oil-burning vessels of 9000 tons for a London firm. A short time before an order was received for two ore-carrying vessels for the same owner. Palmer's Shipbuilding & Iron Co. Ltd., has an order for two 9000-ton cargoes for Newcastle owners. The same builder obtained a contract for a motorship of 12,000 tons, 485 feet in length, Smith's Dock Co. Ltd., has been awarded the contract for six grain-carrying boats for the Canadian Lakes. Short Bros., on the Wear, received orders for three steamers of 10,000 tons, while Pickersgill & Sons Ltd., secured two 9000-ton cargo vessels from the Court line. The Northumberland Shipbuilding Co. has an order from Greek owners for a vessel of 7300 tons deadweight, for which the engines will be built by Richardson and Westgarth, and Robert Thompson & Sons, of Sunderland, has booked two 6000-ton vessels for a Norwegian owner.

Workman Clark Again Active

At Belfast, the output for the year was substantially less than in 1927, due to the change of ownership of the Workman, Clark & Co. yards. While Harland & Wolff Ltd., launched 13 vessels of 78,181 tons and 95,260 indicated horsepower, as against 14 vessels of 62,131 tons and 43,123 horsepower, the Workman, Clark yards launched only one vessel of 357 tons, as compared with an aggregate tonnage of 48,911 tons in 1927. The new firm now has 75,000 tons of shipping in their books. The total tonnage launched by Harland & Wolff Ltd., at Belfast, Glasgow, Greenock and North Woolwich, amounts to 101,786 gross tons and 119,165 indicated horsepower, as against 94,700 tons and 80,575 horsepower in 1927. They have at present about 200,000 tons on hand at Belfast.

On Oct. 2, the first of five twin screw passenger and refrigerated cargo motorships ordered by H. & W. Nelson Ltd. left the Harland & Wolff yards for London for her official trial trip. This vessel, the HIGHLAND MONARCH, illustrated at the head of this article, and her sister ships will trade between the United Kingdom, Brazil and the Argentine, via Spain and Portugal. The service speed is 15 knots. The vessel has a gross tonnage of 14,137 and is propelled by two Harland B. and W. 8-cylinder double-acting 4-cycle motors. The principal dimensions are: Length between perpendiculars, 520 feet; breadth, 69 feet; depth to upper deck, 35 feet 9 inches. Nine

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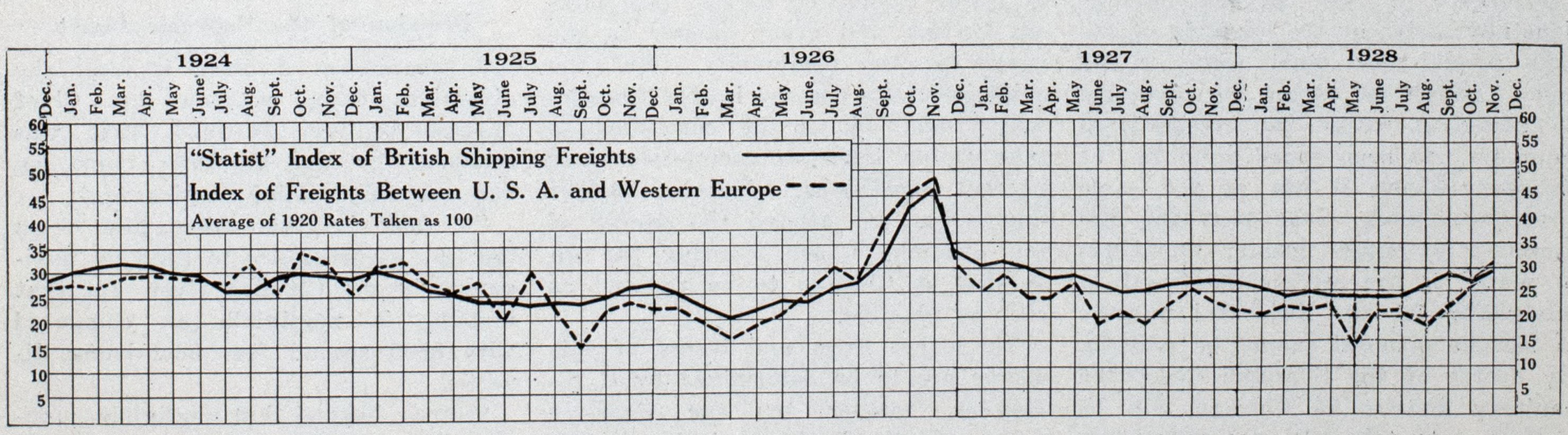


DIAGRAM SHOWING FLUCTUATIONS OF OCEAN FREIGHT RATES FOR FOUR YEARS AND ELEVEN MONTHS

U. S. Lines Bids Received

BIDS for the purchase of the United States lines and the passenger vessels of the American merchant lines were opened at the shipping board Jan. 15. Six separate offers were submitted in accord with the specifications outlined in the board's proposal for sale.

Commenting on these offers, T. V. O'Connor, chairman of the board, said: "The United States shipping board has at all times been eager to get the government out of the business of operating ships as soon as possible whenever that can be done on a basis that will secure a permanent merchant marine under the American flag. In view of the provisions of the Jones-White act, private operators are deeply interested in the purchase of our passenger ships and the board is greatly gratified to see this interest evidenced by the bids which were opened on Jan. 17."

Three of the bidders presented substantial proposals for new ship construction. Likewise, in the case of one offer, it was proposed to rebuild and recondition the laid-up ex-German vessels, MOUNT VERNON and MONTICELLO, fitting them with new oil-burning boiler equipment and new turbine engines.

The highest bid was that of P. W. Chapman & Co. Inc., New York, presented to the board by Joseph E. Sheedy. This offer contemplates the purchase of all the present vessels of the United States lines and the American Merchant lines for the sum of $16,082,000, plus $218,000 for case holds of the two lines. This bidder likewise offered to perform the needed construction to equip the United States lines with modern up-to-date vessels including two liners superior in type to the LEVIATHAN and faster.

A joint proposal of J. H. Winchester & Co. Inc., and Gibbs Brothers Inc., of New York, offered to buy the present ships of the two lines, minus the S. S. PRESIDENT HARDING and S. S. PRESIDENT ROOSEVELT, for the sum of $10,000,000. This offer included $25,000 each for the S. S. MOUNT VERNON and MONTICELLO with agreement to recondition the two vessels. This bidder offered to build new first-class ships and new cabin-type ships and also revealed plans for supplementing the ocean liners with ship-to-shore airplane service and with transatlantic dirigibles.

As an alternative proposal, the J. H. Winchester company offered to buy the five vessels of the American Merchant lines for the sum of $605,000 each, or a total of $3,025,000, for operation over their present route between New York and London. At the present time this company is managing operator of this service for the shipping board.

The American Line Steamship Corp., through its president, P. A. S. Franklin, offered the sum of $6,000,000 for the steamers LEVIATHAN, GEORGE WASHINGTON, AMERICA, REPUBLIC, PRESIDENT HARDING and PRESIDENT ROOSEVELT, the bidder contemplating construction of two new ships. Mr. Franklin, on behalf of the American Line Steamship company, also offered $300,000 each for the ships of the American Merchant lines in the London service.

A bid of $812,000 each was made by the Export Steamship Corp. through its president, Henry Herbermann, for the steamers PRESIDENT HARDING and PRESIDENT ROOSEVELT. This bidder contemplates operating these vessels between New York and Mediterranean ports.

Bidding under the proposition for establishing American flag steamship service between the West Coast of the United States and European ports, the Dollar Steamship Co., San Francisco, offered $505,000 each for the vessels of the American Merchant lines, a total of $2,525,000. As an alternate proposal the Dollar company made the same bid for operation from Atlantic ports.

For the continuance of the American Merchant line service over its present route, the Roosevelt Steamship Co. offered the sum of $455,000 each for the vessels, a total of $2,275,000.

At the close of the opening, the bids were referred to the Merchant Fleet Corp. which will, in turn, make recommendation and report to the shipping board.

Lake Diversion at Chicago Must Stop

THE decision recently rendered by the Supreme Court of the United States on the diversion of water from the Great Lakes through the drainage canal at Chicago is clearly a victory for the interests of lake navigation. Chicago's complete indifference to the serious damage done navigation by the lowering of the lake levels now must come to an end. Though the permit for diversion of sufficient water for navigational purposes has been found valid by the Supreme Court, it has at the same time been made clear that the abstraction of much greater quantities of water to the serious detriment to navigation for the incidental purpose of sewage disposal cannot be allowed. By decree of the Supreme Court the sanitary district of Chicago will be compelled to take all necessary steps for sewage disposal by other means than that of diverting water from the Great Lakes.

This is a complete victory for the navigational interests of the Great Lakes, because of course, it is clear that immediate stopping of diversion of water cannot be carried out without certain and great danger to the health of the community. But the point about the victory is that Chicago will from now on be compelled to take active steps to completely alter present conditions. It can neither ignore nor get around the decree of the Supreme Court ordering the diversion at Chicago to be reduced as soon as possible.

The exact form and terms of this decree are to be determined by C. E. Hughes, master for the Supreme Court. If the basic six inches in the level of the Great Lakes can be restored by stopping this diversion it is obvious that the whole transportation facilities of these great inland waters will be greatly increased to the benefit of all the people not only of this territory but of the United States.

Decision of the Supreme Court

A unanimous decision in the lake diversion case, written by Chief Justice William Howard Taft was rendered by the Supreme Court on Jan. 14. The Chief Justice said:

"It may be that some flow from the lake is necessary to keep up navigation in the Chicago river, but that amount is negligible as compared with 8500 second feet now being diverted.

"Hence, beyond that negligible quantity, the validity of the secretary's

permit derives its support entirely from a situation produced by the sanitary district in violation of the complainants' rights; and but for that support complainants might properly press for an immediate shutting down by injunction of the diversion, save any small part needed to maintain navigation.

"In these circumstances we think they are entitled to a decree which will be effective in bringing that violation and unwarranted part of the diversion to an end. But in keeping with the principles on which courts of equity condition their relief, and by way of avoiding any unnecessary hazard to the health of the people of that section our decree should be so framed as to accord to the sanitary district a reasonably practicable time within which to provide some other means of disposing of the sewage, reducing the diversion as the artificial disposition of the sewage increases from time to time, until it is entirely disposed of thereby, when there shall be a final, permanent operative and effective injunction.

To Determine Practical Measures

"Though the restoration of just rights to the complainants will be gradual instead of immediate, it must be continuous and as speedy as practicable, and must include everything that is essential to an effective project.

"To determine the practical measures needed to effect the object just stated, and the period required for their completion, there will be need for the examination of experts; and the appropriate provisions of the necessary decree will require careful consideration.

"For this reason, the case again will be referred to the master for a further examination into the questions indicated. He will be authorized to hear witnesses presented by each of the parties, and to call witnesses of his own selection, should he deem it necessary to do so, and then with all convenient speed to make report of his conclusions and of a form of decree."

World Shipbuilding Shows Increase

AN INCREASE of nearly 100,000 gross tons in the volume of world construction of merchant vessels was shown at the beginning of this year, according to a statement issued Jan. 16 by Lloyd's register of shipping, covering returns from all maritime countries for the three months ending Dec. 31, last. This is the first quarter in which a gain has been shown since the end of 1927.

Great Britain and Ireland show an increase of 153,000 gross tons over their total for the quarter ended Sept. 30, last; and there are smaller gains reported for France, Japan and Denmark; with reductions for all other shipbuilding countries, including the United States, which is now constructing less than 2 per cent of the world output. In the September quarter, Great Britain and Ireland showed a decrease of 112,000 gross tons, which has been more than offset by the gain in the quarter recently ended.

The comparison between the last two quarters is shown in the following table, the figures being in gross tons:

	Dec. 31, '28	Sept. 30, '28
Great Britain and Ireland	1,242,794	1,089,760
United States	47,949	64,572
Other countries	1,327,258	1,367,010
World total	2,618,001	2,521,342

A year ago the total world shipbuilding was 3,118,000 gross tons, of which 1,580,000 tons were being constructed in Great Britain and Ireland, 97,000 in the United States, and 1,441,000 tons in the other maritime countries combined.

The volume of new tonnage of steamers and motorships on which work was begun during the quarter ending Dec. 31, was nearly 200,000 gross tons greater than that started during the previous quarter. On the other hand, work being pushed toward completion through launchings showed a decrease of more than 300,000 gross tons. And, for the December quarter, the contrast between launchings and new work begun, showed replacements of 171,000 tons in excess of the shipping sent down the ways, whereas launchings aggregated 325,000 tons more than new work during the September quarter.

The reversal of condition is shown in the following tables of gross tonnage covering the last two quarters:

Launchings	Dec. 31, '28	Sept. 30, '28
Great Britain and Ireland	243,045	387,162
Other countries	258,957	424,334
World total	502,002	811,496
New Work		
Great Britain and Ireland	430,338	243,986
Other countries	243,109	241,714
World total	673,487	485,700

With the exception of Great Britain and Ireland, a decrease in the building of motor and steam tankers is shown. A year ago, 744,668 gross tons of these types of vessels were under way throughout the world, as compared with 416,787 gross tons at the end of last September, and only 361,972 tons at the end of 1928. The present total for the United States is only 1800 tons. For other countries, the contrast between the last two quarters is shown as follows, in gross tonnage:

	Dec. 31, '28	Sept. 30, '28
Great Britain and Ireland	174,376	166,550
France	63,696	72,632
Sweden	33,000	43,500
Germany	27,500	30,200
Russia	24,000	29,500

Again a slight decrease is noted in the volume of tonnage of motor vessels under way, although the decline of 23,000 gross tons from the September quarter total represents a drop of and Ireland, Holland and Japan showed slight increases in this type less than 2 per cent. Great Britain of construction during the December quarter. The contrast between the last two quarters is shown by the following table of gross tonnage:

	Dec. 31, '28	Sept. 30, '28
Great Britain and Ireland	536,008	497,598
Germany	156,526	180,497
Holland	121,589	116,910
France	101,221	111,962
Sweden	95,114	107,532
Japan	84,630	73,740
Russia	83,888	88,348
Italy	80,726	117,230
Other countries	136,166	125,785
World total	1,395,868	1,419,602

While more motor tonnage is now being built than of all other types of vessels combined, the excess being more than 170,000 gross tons, this figure compares with a lead of more than 300,000 tons at the end of the September quarter. Slightly more than 53 per cent of all merchant shipbuilding is to motor types, as against 56 per cent at the close of September. The comparisons are shown in the following table of gross tonnage:

	Dec. 31, '28	Sept. 30, '28
Motor vessels	1,395,868	1,419,602
Other types	1,222,133	1,101,740
World total	2,618,001	2,521,342

A year ago over 1,600,000 gross tons of motorships were being constructed. The current returns show that while only 43 per cent of Great Britain and Ireland's construction is of motor vessels for the other countries combined, 62 per cent of all building is of ships with internal combustion engines. The two groups compare as follows, in gross tons:

	Britain and Ireland	Other countries
Motor vessels	536,008	859,860
Other types	706,786	515,347
Total	1,242,794	1,375,207

Returns covering the horsepower of marine engines being built or installed during the December quarter show a decrease for oil engines, as well as for the steam reciprocating and turbine types.

The total indicated horsepower of oil engines, for use in motor vessels at the end of December was 1,210,908, as compared with 1,281,728 at the end of September. The aggregate for Great Britain and Ireland advanced from 367,490 to 377,248; while that for Germany declined from 190,905 to 185,980. Denmark's figure fell from 171,840 to 113,600; and Switzerland's total increased from 76,670 to 96,030. Sweden gained slightly, her figure moving from 85,683 to 87,285. For all other countries combined, there was a drop from 388,590 to 360,765.

For steam turbines, the returns show that the world aggregate declined from 345,500 shaft horsepower in the September quarter to 328,290 in the December one. These figures exclude Germany, for which country no returns are available. Great Britain and Ireland's total dropped from 257,400 to 232,700; but that for the other countries combined rose from 88,100 to 95,590.

On steam reciprocating engines, the advance for the world was from 414,001 to 485,360. Great Britain and Ireland's figure rose from 221,256 to 284,195, and for all other countries from 192,745 to 201,165.

There were only two changes in the relative ranking of the various shipbuilding countries as to construction during the quarter ended Dec. 31. Lloyd's shows the comparative construction figures for the last two quarters in the following gross tonnage

	Dec. 31, '28	Sept. 30, '28
Great Britain and Ireland	1,242,794	1,089,760
Germany	382,422	423,375
Holland	182,229	191,290
France	161,566	138,362
Japan	118,580	99,257
Sweden	99,244	110,182
Russia	98,048	108,428
Italy	93,316	132,739
Denmark	82,780	64,923
United States	47,949	64,572

At the beginning of 1928, the total of world shipping construction was just half a million tons greater than the 2,618,000 tons figure of today, but the current activity is greater.

Large Diesel Trawler Enters Service

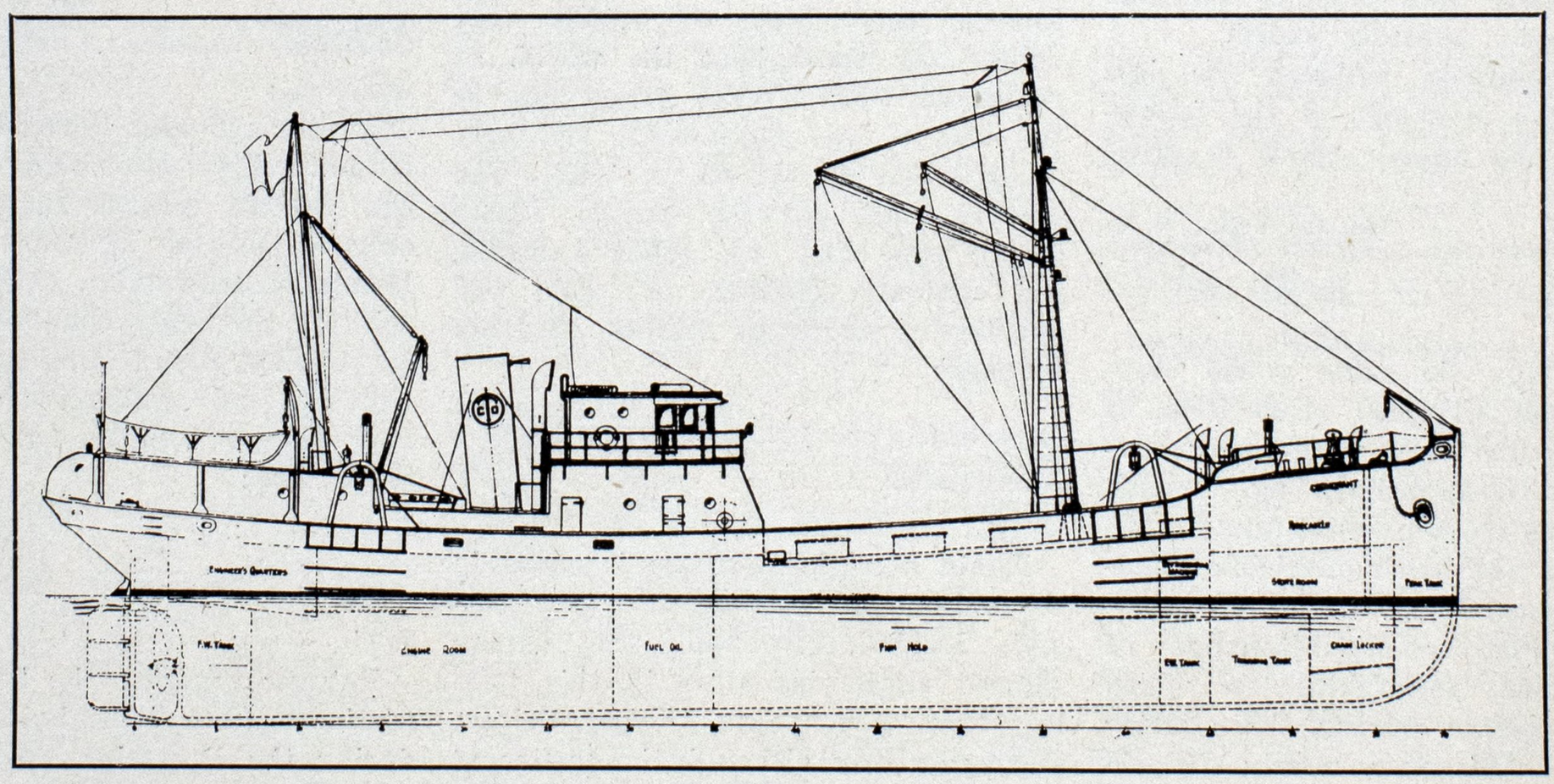
WHEN fishing became a great industry it was inevitable that power should be applied to the units of the fleet in order to multiply the effectiveness of the fishermen and to remove as nearly as possible the uncertainties of delays in getting out to the banks and in getting back to markets. For many years steam has been applied with successful results and the "steam trawler" made a famous name for itself during the war. Though the advantages of the diesel engine over the steam engine, in the powers involved, are evident it has taken some time for the fishermen to turn from steam to diesel drive. But it has now been done in a number of instances and the results have been even more satisfactory than anticipated. The latest and largest example of diesel drive in a trawler is the CORMORANT, 150 feet in length overall and 25 feet wide, recently completed at the shops of the New London Ship & Engine Co.

The trial trip on this, said to be, the largest diesel trawler in the world was made out of New London, Conn., on Jan. 2. The CORMORANT left the yard of the builder at 12 noon and returned to the yard four hours later after entirely successful trials. Acceptance by the owner, the Ocean Trawling Co., Boston, followed immediately.

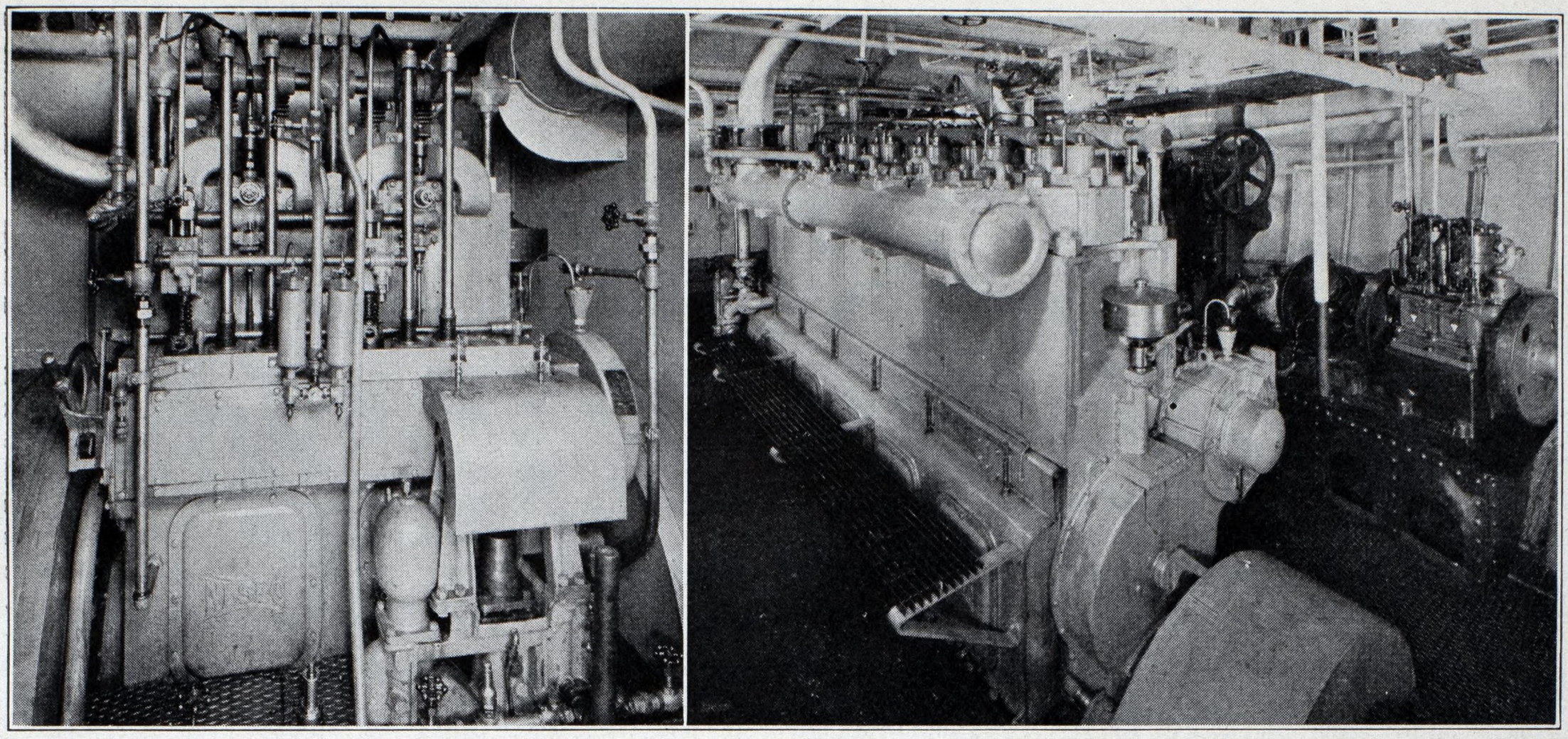
It is interesting to note that the CORMORANT'S net fish capacity is 400,000 pounds and that a steam trawler of the same size can only carry 250,000 pounds of fish due to the additional space occupied by steam engine, boiler and coal bunkers. This vessel's fish capacity is therefore increased 60 per cent by the use of a compact diesel engine, and in capacity she is larger than any other trawler in the United States.

The galley is located on the main deck aft and it is equipped in a modern way throughout. Crew's quarters are located forward and can accommodate 16 men. The accommodations for mate, chief engineer, two assistant engineers and a cook are located aft. There are two metallic lifeboats with a capacity of 25 persons each.

The estimated fuel and operating costs in the case of the CORMORANT with her 500-horsepower diesel engine will be from $18,000 to $20,000 less per year than for an equal powered steam vessel. Her service speed is about 10½ knots.



Diesel Trawler Cormorant, 150 feet long. Engined and Rebuilt by New London Ship & Engine Co.



ENGINE ROOM OF THE DIESEL TRAWLER CORMORANT. LEFT—AUXILIARY NELSECO DIESEL ENGINE OF 115 BRAKE HORSEPOWER RIGHT—MAIN ENGINE 500-HORSEPOWER NELSECO DIESEL ENGINE, SIX CYLINDERS, MECHANICAL INJECTION DIRECT CONNECTED TO PROPELLER

The hull of the CORMORANT was originally built by the French government and Cox & Stevens were retained by the owner to make complete hull arrangement plans with the view of using diesel power instead of steam. The Electric Boat Co., Groton, Conn., then worked out detailed plans and built and installed the machinery and the equipment. The accompanying table gives the general characteristics of the vessel. The main engine is the standard Nelseco diesel, single acting, 4-cycle, 6-cylinder, and mechanical injection. The diameter of the cylinders is 15 inches and the stroke is 22 inches. At 230 revolutions per minute this engine will develop 500 horsepower.

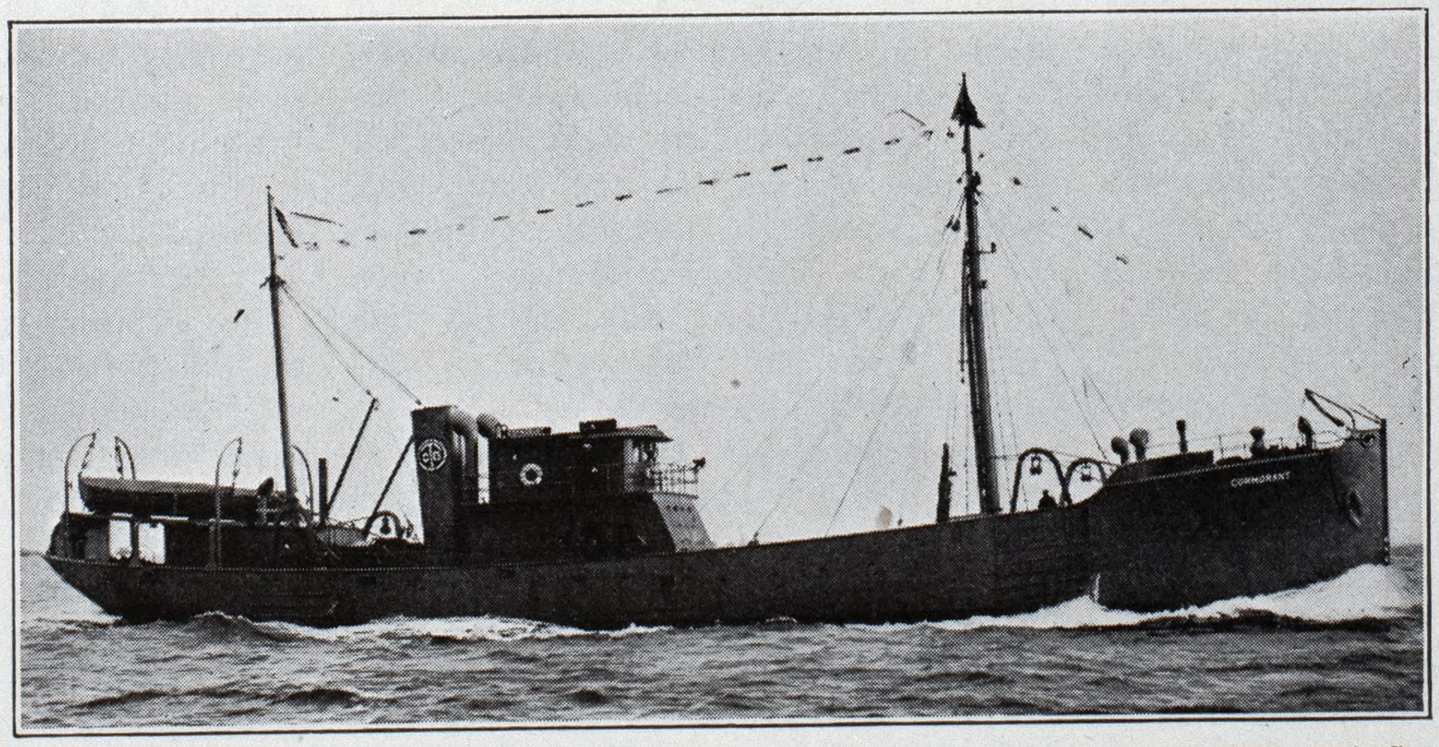
An auxiliary diesel engine of 115 horsepower, also the Nelseco type, has been fitted as a generating unit. It is direct connected to a 65-kilowatt, at 250 volts, generator supplied by the Electro-Dynamic Co. On the shaft of the generator extended there is a 3-kilowatt, 125 volts, exciter. The current generated is applied to a 75-horsepower motor, at 250 volts, directly connected to the trawling winch. This motor has variable voltage control. It was supplied by the Electro - Dynamic Co. There are also two 10 - kilowatt each, auxiliary generating sets driven by 16-horsepower, 4-cycle, 2-cylinder, mechanical injection diesel engines. The steering gear is of the electric control type made by the New London Ship & Engine Co.

An important feature of the CORMORANT'S equipment is the refrigerating apparatus which was installed by the Fairbanks Engineering Co., Boston. It is designed to properly cool the huge fish hold which is the whole width of the vessel and 45 feet in length. By proper refrigeration furnished in this manner the ice consumption has been greatly reduced thus permitting a greater cargo of fish.

A 50-watt Radio corporation wireless sending and receiving set has been installed. An interesting and important feature of the CORMORANT is her complete pumping system. A triplex, 5 x 8 inches, plunger type, electric motor driven, fire and bilge pump with a capacity of 180 gallons per minute at 70 pounds pressure is so connected that it may pump from or to any compartment in the vessel. There is also an electric driven service pump for washing down decks and fish. This pump is also connected to the fire main. For emergency purposes there are two hand pumps which can be used for transferring fuel and lubricating oil from the main tanks to the day service tanks. Running water to the galley staterooms, crew's quarters and sanitary system is supplied by two automatic motor - driven pumps. A feature of the pumping system is the connection of the bilge drainage lines to the pumps on the main engine. This assures a drainage pumping unit always.

Diesel Trawler Cormorant General Particulars

Length overall, ft. in.	150—0
Length between p. p., ft. in.	139—5
Beam molded, ft. in.	25—0
Depth molded, ft. in	14—7
Fresh water capacity, gal.	15,000
Fuel oil (diesel) capacity, gal.	25,000
Speed in service, knots	10.5
Radius of action (full speed and full tanks) nautical miles	8,000
Main engine, Nelseco diesel, B.H.P.	500
Auxiliary engine, Nelseco diesel, B. H. P.	115
Fish capacity, net pounds	400,000
Ice capacity, pounds	100,000
Cargo capacity, total pounds	500,000



DIESEL TRAWLER CORMORANT RECENTLY COMPLETED. LARGEST OF HER CLASS

Leader of Lake Shipping Dies

Harry Coulby 1865-1929

THE death of Harry Coulby on Jan. 17, removed from Great Lakes shipping the personality which had dominated it for many years. Variously called "the Czar of the Great Lakes," "the Napoleon of lake shipping interests," he was by far the most powerful leader of recent years in Great Lakes marine circles. His influence was also deeply felt in industries closely allied with his chosen career. Mr. Coulby had journeyed back to his native England to spend the holidays with his sister in Claypole and two brothers in Newark. His death occurred at the Ritz hotel in London where he was stopping preparatory to sailing to the West Indies on his return to America.

The story of his life is a romantic tale of tenacious determination backed by keen intelligence, driving onward with a strength of character that overcame adversity and surmounted every obstacle, until success came in wealth, power, influence and in undisputed leadership in his special field of endeavor.

Born on a farm near Nottingham, Eng., Jan. 1, 1865, his school career terminated when he was 10 years of age. Reading of the great inland lakes of America, and picturing this country as the land of adventure and opportunity, he very early in life determined to seek his fortunes across the Atlantic. Following the close of his years in school, he worked on a farm until he was 17, saving enough to pay his passage across to New York.

The year 1883 found him in New York, his savings gone and no way of traveling to Cleveland, his chosen destination, except on foot. Walking the 600 miles and working along the way in order to earn his expenses, he reached Cleveland where he had resolved he would become a sailor. The fitting out of the ships had been completed before his arrival, consequently, he was compelled to seek employment elsewhere.

His early study of shorthand proved to be of value and he obtained employment with the Lake Shore and Michigan Southern railroad as secretary to president Newell. This was at the age of 18. His wages of $40 a month were even at that time hardly sufficient for a modest existence and when an increase was refused he terminated his railroad connection. He then became private secretary to Col. John Hay, who was later to become secretary of state and ambassador to England, and who was at that time collaborating with Nicolay in their *Life of Abraham Lincoln*. During the three years which he spent with Colonel Hay, part of his time was

passed in Washington. While there, two opportunities came to him—one with a department of the government for $1800 a year and the other with Samuel Mather in Cleveland. Colonel Hay and Samuel Mather were brothers-in-law and the colonel had recommended Mr. Coulby for a position. Even though the latter paid considerably less, Mr. Coulvy decided in favor of it and his acceptance of the position of clerk with the then newly organized firm of Pickands, Mather & Co., terminated his association with Colonel Hay. Mr. Coulby was then 21 years of age.

Prosperity came to the company and mastery of every phase of the shipping industry soon lead to his admission to membership in the firm. Before long, he had become the active head of the fleet operations of Pickands, Mather & Co. In 1904, he became president of the Pittsburgh Steamship Co., the freight-carrying subsidiary of the United States Steel Corp. on the Great Lakes. During his service in these capacities for 19 years he directed the operations of the largest fleets on the lakes and controlled the larger part of the entire freight movement.

By the year 1924, expansion of the activities of Pickands, Mather & Co. had been so great that Mr. Coulby was obliged to resign his position as president of the Pittsburgh company in order to devote his full time to directing the fleet of Pickands, Mather & Co., known as the Interlake Steamship Co. After retirement from the Pittsburgh company he became chairman of the board of directors of that company.

During the war, Mr. Coulby rendered invaluable service to the country and to Great Lakes shipping as well. Ten years prior to this time, union restrictions and hindrances had become unbearable to vessel owners and beginning in 1908, mainly on Mr. Coulby's initiative, all lake vessels were operated on an open shop basis which contributed immeasureably to steady progress. The event of war opened the way for the unions to appeal to the government for shipping board control. Under Mr. Coulby's able leadership as head of the committee which appealed to Washington, a respite was granted by the government on the conditions that the lake vesselmen would meet the full demands of the iron ore, coal, and grain trades, considered the three essentials to winning the war.

As a direct result of this committee's activities, and with no increase in capacity, the lake fleets moved more than 60,000,000 tons of iron ore as against the prewar record of only 49,000,000 tons. This centralized control gave a record coal movement for 1918 and terminated the movement to bring lake shipping under government control. By his insistance on fair

(*Continued on Page* 58)

Marine Business Statistics Condensed

Record of Traffic at Principal American Ports for Past Year

New York

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
December, 1928	554	2,369,709	559	2,342,928
November	516	2,237,046	550	2,418,097
October	596	2,666,360	589	2,571,403
September	545	2,424,887	543	2,362,154
August	580	2,533,877	622	2,733,727
July	602	2,526,107	564	2,415,168
June	537	2,386,509	602	2,645,954
May	580	2,498,280	590	2,463,196
April	566	2,487,959	541	2,359,979
March, 1928	548	2,338,855	578	2,449,705

Philadelphia

(Including Chester, Wilmington and the whole Philadelphia port district)
(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
December, 1928	106	309,214	72	213,261
November	88	229,598	36	89,931
October	91	250,902	48	137,352
September	84	238,234	43	122,389
August	96	266,104	58	161,365
July	101	254,378	60	143,573
June	101	270,069	72	183,534
May	110	281,648	74	179,108
April	109	261,735	60	140.547
March, 1928	95	254,304	65	167,100

Boston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
December, 1928	100	312,100	69	214,047
November	107	315,954	74	214,574
October	112	347,432	72	221,761
September	113	383,749	77	245,068
August	130	340,569	107	270,757
July	155	378,368	111	289,121
June	143	319,611	100	254,906
May	134	204,575	103	231,851
April	110	343,360	65	205,257
March, 1928	108	348,026	67	194,408

Portland, Me.

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
December, 1928	25	61,251	25	62,930
November	20	37,250	19	33,408
October	23	39,959	22	40,588
September	30	53,338	30	51,018
August	30	48,256	28	47,078
July	38	68,208	38	66,389
June	30	40,255	25	33,834
May	23	26,648	19	28,673
April	20	51,854	19	50,175
March, 1928	20	58,110	22	69,400

Providence

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
December, 1928	6	20,741	8	32,974
November	10	35,147	9	20,551
October	6	14,667	9	20,551
September	5	18,895	3	12,777
August	7	28,611	4	19,978
July	8	26,920	7	25,451
June	8	35,177	7	25,741
May	7	21,068	4	12,765
April	4	15,670	3	12,362
March, 1928	7	27,885	6	26,037

Portland, Oreg.

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
December, 1928	39	144,128	56	205,572
November	30	115,469	53	198,195
October	42	154,623	62	224,018
September	41	150,368	57	203,758
August	35	136,504	47	172,693
July	30	111,042	46	157,354
June	23	85,328	40	144,572
May	25	96,976	44	159,070
April	37	137,821	41	152.042
March, 1928	29	111,490	49	170,655

Baltimore

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
December, 1928	127	392,832	134	400,355
November	134	412,100	134	417,523
October	133	402,263	131	406,142
September	119	374,500	128	396,749
August	133	404,303	144	440,016
July	128	378,827	121	353,758
June	127	392,580	135	412,620
May	135	413,038	151	439,278
April	140	396,942	134	394,124
March, 1928	128	391,117	137	408,927

Norfolk and Newport News

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
December, 1928	32	73,123	90	223,258
November	19	58,171	77	209,023
October	12	33,817	66	173,729
September	21	64,366	69	178,508
August	19	50,096	83	208,639
July	15	33,548	81	212,471
June	19	42,454	63	155,944
May	25	58,472	78	207,857
April	15	35,122	81	189,564
March, 1928	18	39,102	89	209,171

Jacksonville

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
November, 1928	26	64,406	27	67,621
October	23	55,147	22	53,094
September	40	89,032	42	94,981
August	37	85,186	34	83,694
July	30	81,634	31	79,222
June	26	54,449	28	57,111
May	26	58,800	28	63,779
April	26	68,581	26	61,939
March	25	65,435	28	68,630
February, 1928	31	70,881	28	58,896

Key West

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
December, 1928	79	79,816	72	79,354
November	98	81,666	101	82,863
October	120	111,450	116	106,139
September	84	60,079	86	62,698
August	91	73,771	89	69,532
July	86	65,838	88	67,720
June	98	83,417	93	78,006
May	134	117,930	129	112,303
April	101	75,140	102	76,450
March, 1928	119	96,746	112	94,408

Mobile

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
December, 1928	100	234,963	89	212,341
November	91	203,865	77	184,537
October	89	185,031	71	166,606
September	85	209,709	74	193,661
August	90	186,097	78	178,036
July	101	209,990	82	189,008
June	85	176,088	82	178,337
May	102	227,194	90	209,449
April	114	217,803	105	203,515
March, 1928	107	242,444	97	246,634

Seattle

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
December, 1928	62	249,729	63	259,823
November	68	285,564	75	306,605
October	62	245,420	60	243,778
September	57	229,718	66	254,503
August	55	220,858	53	228,378
July	64	261,850	58	228,946
June	44	180,482	44	185,765
May	53	206,254	61	239,241
April	56	226,257	54	210,908
March, 1928	46	191,601	46	196,371

New Orleans

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
December, 1928	274	762,019	260	690,010
November	252	690,157	263	716,105
October	259	682,184	329	627,989
September	228	617,636	248	661,643
August	264	667,055	265	690,341
July	260	659,457	245	615,234
June	253	615,672	263	640,136
May	263	671,333	261	647,504
April	254	656,537	265	666,345
March, 1928	265	669,301	282	720,407

Charleston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net. tonnage	—Clearances— No. ships	Net tonnage
December, 1928	20	46,569	17	43,041
November	22	56,983	22	50,043
October	24	59,136	26	61,673
September	21	60,956	22	54,537
August	24	62,574	26	63,874
July	26	59,204	27	61,976
June	17	37,881	20	41,123
May	29	71,467	32	78,731
April	26	60,165	21	52,590
March, 1928	29	79,789	27	67,472

Galveston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
December, 1928	45	129,285	107	355,592
November	49	150,205	109	351,063
October	41	110,825	135	420,534
September	26	69,433	98	313,816
August	31	91,959	78	261,804
July	41	91,686	68	196,424
June	20	52,884	64	210,110
May	35	96,852	44	126,027
April	32	85,685	43	132,534
March, 1928	35	75,924	47	121,106

Los Angeles

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
December, 1928	199	551,301	154	487,064
November	209	541,906	179	514,647
October	221	568,910	216	515,889
September	188	504,630	189	482,133
August	164	539,454	160	514,978
July	153	547,612	131	485,817
June	152	434,811	114	428,885
May	236	545,132	150	478,553
April	183	519,918	184	498,424
March, 1928	182	522,110	222	483,105

San Francisco

(Exclusive of Domestic)

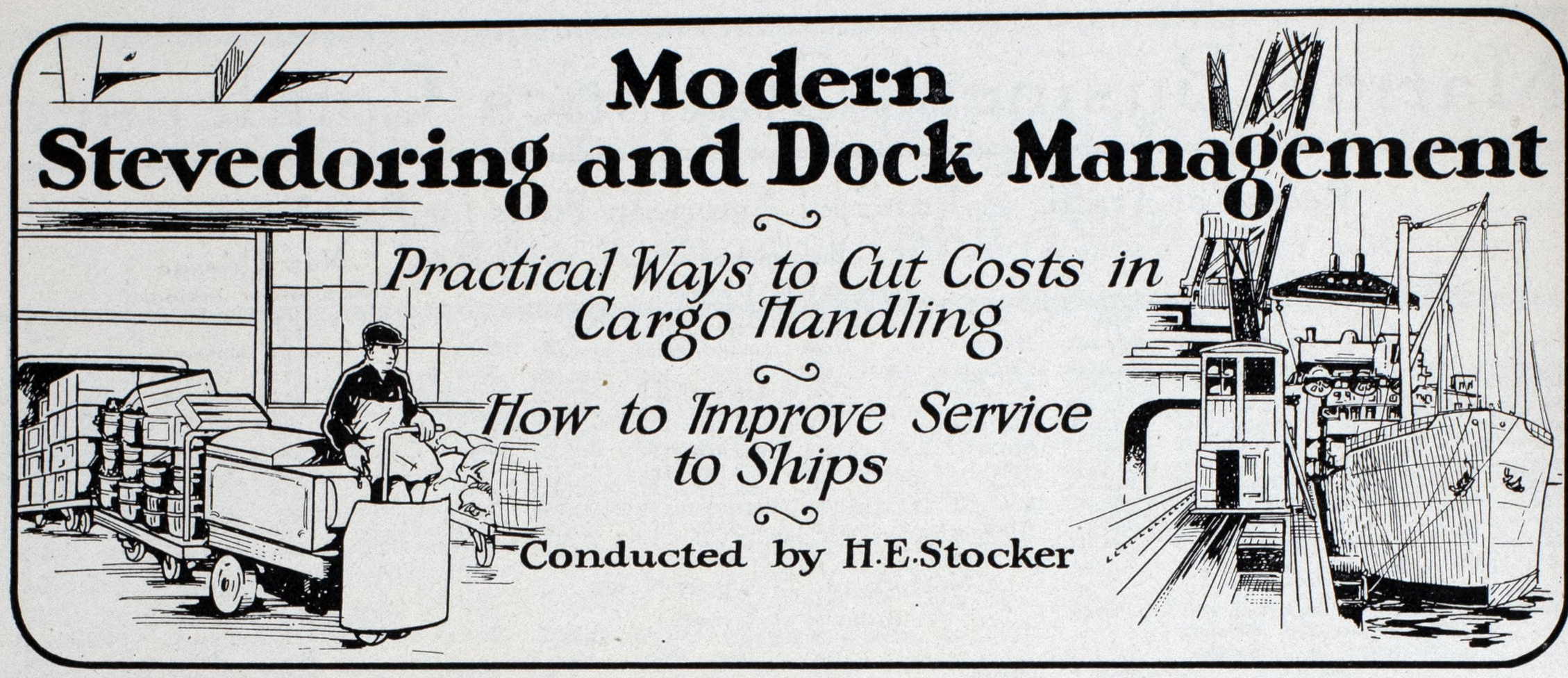
Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
December, 1928	155	607,902	152	582,612
November	157	504,269	157	589,810
October	165	620,117	155	596,750
September	180	623,999	175	579,262
August	185	674,832	164	643,965
July	147	662,437	122	454,802
June	149	567,839	141	539,600
May	174	869,626	175	625,910
April	157	580,506	150	565.111
March, 1928	179	629,773	162	648,057

Port Arthur

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
July, 1928	24	78,538	33	109,230
June	25	80,481	25	79,758
May	27	92,323	28	90,108
April	24	73,693	26	88,253
March	46	127,039	47	131,741
February	47	144,273	44	144,508
January	20	69,947	20	72,185
December	23	67,105	21	68,602
November	21	64,277	25	80,084
October	18	50,632	25	82,177
September, 1927	16	51,492	29	83,728

Note: The figures given in this table are for direct entrances and clearances. Additional vessels in foreign trade enter and clear from and to other American ports after original entry and before final departure. At the port of Philadelphia, for instance, additional vessels in the foreign trade in this category were 56 of 183,973 net tons entered and 77 of 258,210 net tons cleared for the month of December.



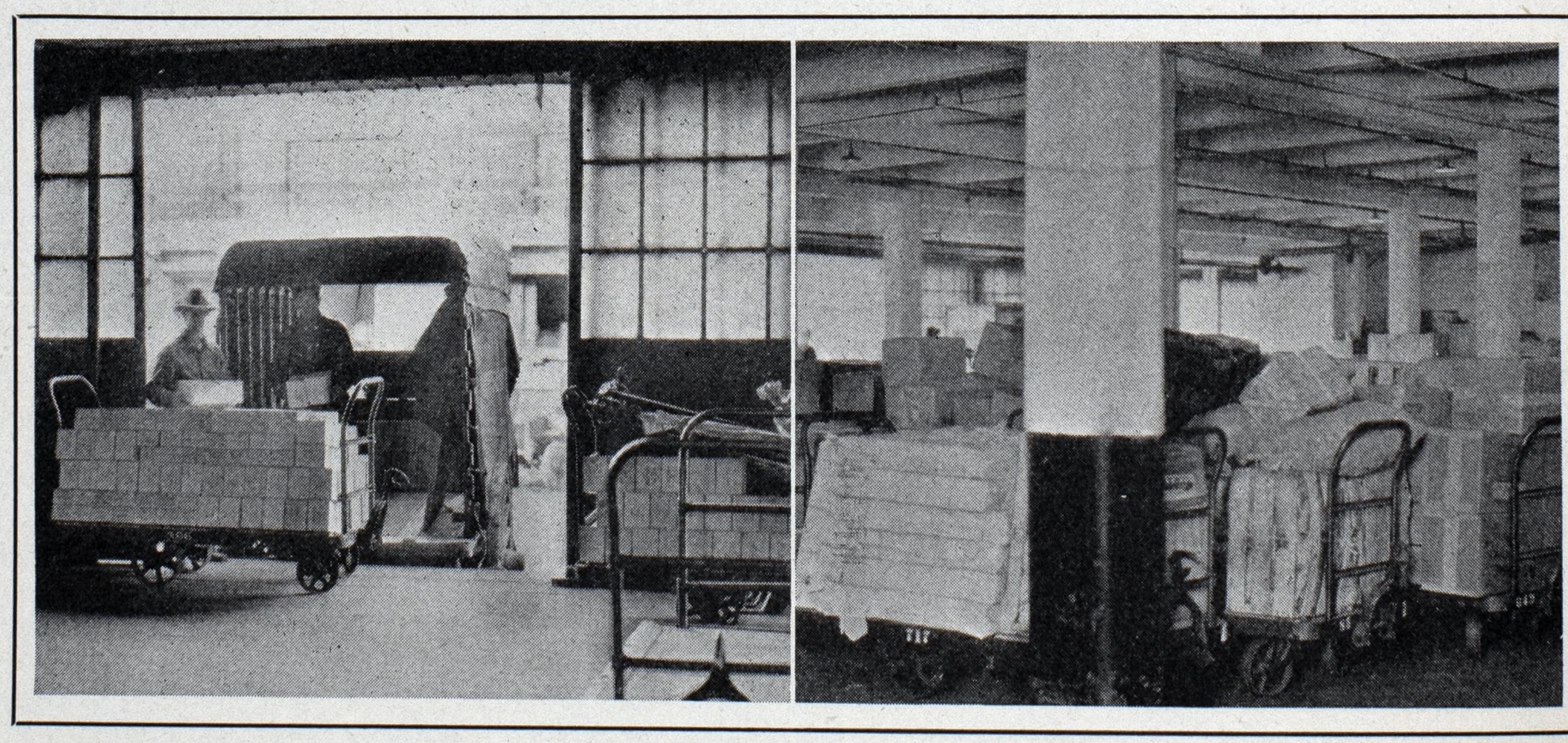
Cargo Handling Costs Cut in Half Using Tractors and Trailers

A NOTABLE example of the use of the tractor trailer method for handling general cargo is found in the operation of the Goodrich Transit Co. This is because it exemplifies in the highest degree the application of that important principle of cargo handling—keep the freight off the floor of the dock and the deck of the ship. The Eastern Steamship Co., the Old Bay line and a number of other companies, use tractors and trailers on the dock and for carrying the freight into the ship, but there it is unloaded to the deck.

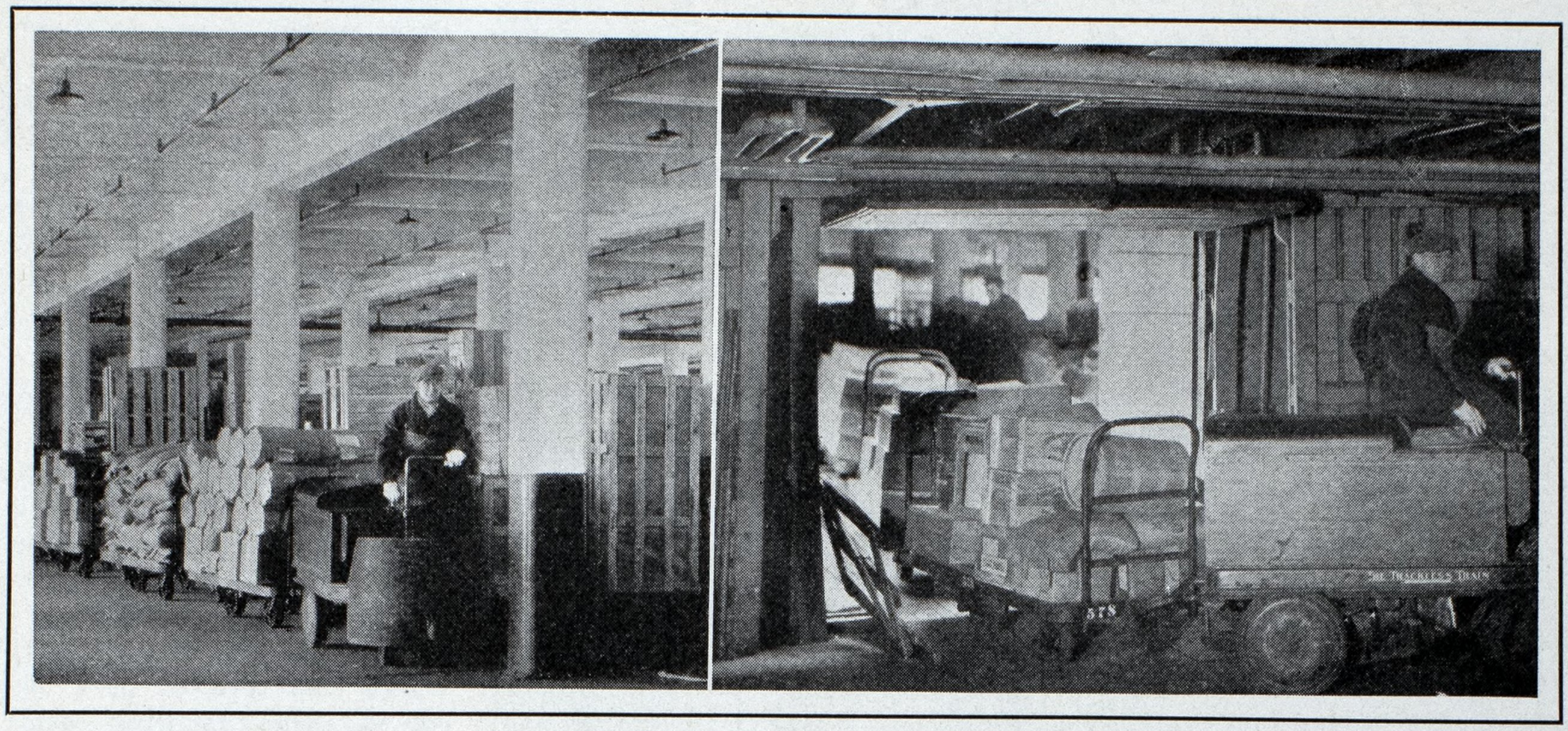
The Goodrich Transit Co. was selected for this article because it is one of the most complete examples of the application of the principle mentioned by the practical use of tractors and trailers. The tractor trailer method carries out this principle by keeping the freight on wheels, as contrasted with the skid and lift truck method which keeps the freight on skids.

This line operates throughout the year between Chicago and Racine, Milwaukee and Sheboygan on the Wisconsin shore of Lake Michigan and Grand Haven and Muskegon on the Michigan shore. During the summer the schedule is extended to harbors which are closed in winter and to other points by the requirements of passenger traffic.

Steamers of the Goodrich line are between 250 and 300 feet in length and from 40 to 50 feet in breadth. All have 'tweendecks. Only one steamer has a deep lower hold. These



Left—Receiving Freight Direct onto Trailers. Right—Freight on Dock Ready to be Stowed into Ship



Left—Electric Tractor Hauling Train on Dock. Right—Train of Less Carload Freight Hauled into the Ship by Electric Tractor

ships have only one side port on each side for handling cargo and no overall hatches. The cargo is almost entirely in less than carload lots, with the exception of fresh fruits and vegetables in the summer and in the fall. This cargo includes practically everything; small packages, large packages, barrels and drums, kegs, steel bars, pipe, hardware, machinery, and merchandise of all kinds.

Average Haul Is 350 Feet

The Chicago terminal of the Goodrich company is 1000 feet long and 120 feet wide. It is divided into two main sections, one for the steamers covering Michigan shore points and the other for the Wisconsin shore steamers. Each of these sections is divided into an inbound section and an outbound section. These sections are again divided into sections for candy, fruit and other special commodities. The docks at the other ports are of various sizes and kinds of construction.

An average haul of the tractor-trailer trains is 350 feet. This is exclusive of the transfer freight which averages close to 1000 feet. Transfer freight is freight that arrives at one of the main sections of the dock and is to be sent out from the other main section. Daily tonnage at Chicago ranges from 800 to 1300 tons.

The stevedoring organization consists of shore gangs and a gang between 25 and 30 men who live on the ship. The ship stevedores are paid an hourly rate and supplied with meals and sleeping quarters. They take the freight from the dock into the ship and reverse this process at destination. Shore gangs receive and deliver the freight and move it between points on the dock.

Before the Goodrich company bought tractors and trailers, two wheeled hand trucks were used for handling cargo. The new equipment consists of 1200 trailers and 8 tractors. The standard trailers used are 6 feet long, 3 feet wide and 14 inches high and have a rated capacity of 4000 pounds. They are equipped with roller bearings for the wheels and ball bearings for the caster plates. These bearings, in conjunction with large wheels, (12-inch in the rear and 10-inch caster wheels, each with a crowned face), and a 3½-inch lead for the casters, makes it easy to move the trailers by hand when it is necessary or advisable to do so. Length and width and rounded corners of the standard trailer used, the ability to turn in a complete circle on the rear wheels, and elimination of the handle found on fifth wheel trailers results in combining maximum maneuvering ability with a carrying capacity suitable to average conditions.

Special Trailers With Bodies

Special trailers equipped with large crate-like bodies are used in carrying shipments of metal filing cabinets from Muskegon, Mich., to Chicago. The trailers are loaded at the factory and then taken to the dock by motor truck. At the dock the trailers are taken into the ship in the usual manner. On arrival at Chicago the filing cabinets are taken off the trailers and are placed in a motor truck. This method has substantially reduced the packing expenses of the manufacturer. The empty trailers are returned either with the factories' inbound shipments

H. E. Stocker

H. E. STOCKER, who has been retained by MARINE REVIEW *to conduct a department devoted to practical ways and means for greater efficiency in cargo handling so that costs may be reduced, is resident manager for the McCormick Steamship Co. at New York. His experience and his interest in shipping affairs have to do particularly with handling cargo. He has made a practical study of this problem on both the West and East coasts and abroad.*

or are used by the Goodrich company for such freight as cigarettes and tobacco.

The power equipment consists of four electric and four gasoline tractors. Gasoline tractors only are used on the ship because the ships are not equipped with electric charging sets. The electric tractors are 5 feet 11 inches long and 3 feet 6 inches wide, and have a turning radius of 4 feet 8 inches. The bers on the trailers are for purposes of identification in maintenance and lubrication.

During the winter months approximately 40 per cent of the cargo is stowed on trailers. In summer 30 per cent of the general cargo and 50 per cent of the fruits and vegetables are stowed on trailers. When the contemplated 400 additional trailers are purchased, the percentage of freight carried this way will be considerably

TRAIN OF FRUITS AND VEGETABLES BEING HAULED OUT OF SHIP

other tractors have approximately the same dimensions. The design of these units also takes into consideration the restricted spaces in which they must operate.

Freight is placed directly on the trailers. The economy of receiving freight directly to trailers is obvious, especially when it consists of small cases as shown in one of the accompanying illustrations. Big savings have been obtained by combining seventy 28-pound baskets of grapes into a trailer load. The trailer in this case is equipped with flair boards to increase its cubic capacity.

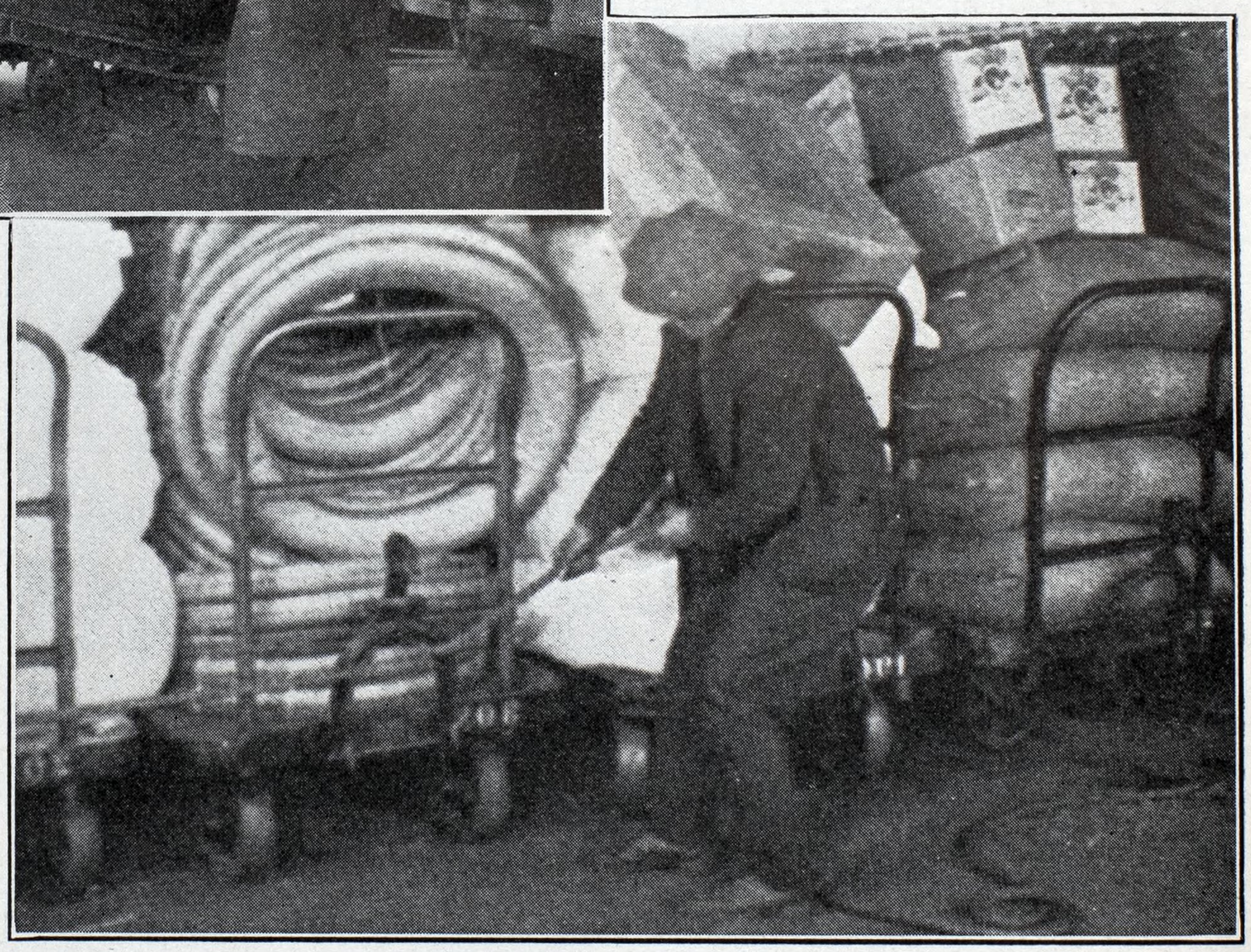
After the trailer is loaded it is hauled by a tractor to a specified section of the dock where it is placed in proper order for stowage in the ship. The average trailer train consists of four trailers. A maximum of 40 loaded trailers is attained when cargo is transferred from the inbound section to the outbound section. The average load is 800 pounds, exclusive of the fruit and vegetables. Accompanying illustrations indicate clearly the class of general cargo handled and also the compact size of the electric tractors used. The number of trailers is increased, and thus reducing cost.

One of the accompanying illustrations shows a tractor pulling a train of trailers, loaded with vegetables, out of the ship. While there are no tides on Lake Michigan to complicate this operation, winds raise the water level as much as two and one-half feet. When stowed in the lower hold, the trailers are lowered from the 'tweendeck by elevators and are then pushed into place by hand. But instead of securing them as shown in the illustration, they are now secured by blocking the caster wheels with short pieces of rope. In rough weather a little extra care is given to the stowage but even in the worst weather the cargo is carried satisfactorily. When there is a shortage of space, freight is piled on top of the trailer loads. Before this is done a chalk line is drawn across the load to keep the marks separate. Only one mark is placed on a trailer.

Deliveries are made direct from trailer to consignees truck, whenever possible. If delivery is not taken within a day, the freight is floored. When the additional 400 trailers are purchased, this will be largely eliminated. This method of handling cargo by keeping the freight on wheels has resulted in a 50 per cent cut in cargo handling costs, as well as important savings of ships' time. The initial purchase price of the equipment was $62,000, and resulted in a saving of $80,000 in the first year.

On the fruit run, two steamers do the work that formerly required three. Fuel and other expenses have been reduced because it is easier for the ships to maintain the schedule which is the principle stock in trade of the Goodrich line. Shippers and consignees trucks have been expediated with consequent traffic benefits.

It is obvious that this method of keeping freight off the floor of the dock and the deck of the ship is applicable to other lake services and



TRAILERS STOWED IN SHIP LOADED WITH FREIGHT AND READY TO BE HAULED OUT AT DESTINATION

also to similar services on rivers, canals, bays and sounds. The Hudson River Night line and the New Bedford, Wood's Hole line of the New England Steamship Co. are carrying some trailers between terminals. The contemplated new ships of the Hudson River Night line are planned to carry 700 trailers.

There seems to be no serious practical reason why this plan cannot be worked out on coastwise and on short foreign runs. The seas are not any worse than on the lakes in certain routes. Most of the ships are equipped with side ports and when they are not, trailers can be quickly slung over-side as they are now being handled at Baltimore. The merchants and Miners Transportation Co. carries trailers on the steamers running between Jacksonville and West Palm Beach.

An objection offered is that with full cargoes it would be impractical to carry freight on trailers because of the space lost between the deck of the ship and the bottom of the trailer. However if full cargoes were carried most of the time, the space lost by carrying cargo on trailers, would not be the measure of the money loss because the economies and traffic benefits obtained by carrying freight on trailers more than offset the loss of space. Furthermore, the use of tractors and trailers makes it possible to speed up the schedule thereby increasing the yearly carrying capacity of the ship.

The only limiting factor is the capital charges on the trailers. These charges amount to about 5 cents a day. Therefore, if it costs 30 cents a ton to handle a trailer load, 15 cents per ton is saved, plus other economies, if a trailer is carried on a ship for three days. The other economies result from less claims and shortening the ships time in port. Expediting loading and discharging results in less overtime expense, and less expenditure of fuel for making up lost time.

Of even greater importance are the traffic benefits. The profits from additional business secured or from old business retained because of the better service given the shipping public, may exceed by many times the saving resulting from a cut in cargo handling costs.

The Goodrich Transit Co. presents an excellent example of what can be accomplished by combining the flexibility, maneuvering ability and ease of movement found in trailers with the application of the principle, "Keep the freight off the floor of the dock and the deck of the ship." This principle has been applied by keeping the freight on wheels which in turn has resulted in bringing about handling in larger units and the speeding up of horizontal movements or hauls by the use of power equipment.

By determined efforts to apply this principle, in addition to the various minor economies effected and traffic advantages gained, cargo handling costs were cut 50 per cent with the result that the initial purchase of $62,000 worth of equipment was paid for in less than 10 months.

Keep Cargo Off Deck of Ship and Pier

HANDLING is expensive, therefore, economy in cargo handling is obtained by not handling it. The most important principle of cargo handling is to "Keep the freight off the floor of the dock and the deck of the ship."

An example of the high cost of handling is found on the docks at Los Angeles. One dollar a ton is charged for loading loose slate into cars while 60 cents a ton is charged on cases of canned goods. A similar situation exists with loose brick on which the charge is 75 cents a ton. All package goods take a lower carloading charge per ton, ranging from 40 cents on sacks of cement, 45 cents on bags of nitrate of soda, 55 cents on boxes of tin plate to 60 cents on cases of soap.

A saving of 40 per cent could be effected in loading loose roofing slate into cars on the Los Angeles docks if handling were reduced by combining the pieces of slate into units of 50 to 60 pounds as cans of fruits and vegetables are now combined into cases of these weights.

A total saving of 70 per cent could be effected if 50 of these cases of slate were combined on a skid as case goods, paper, castings and other commodities are. Fifty cases of 50 pounds each would give an aggregate weight of 2500 pounds. This unit could be moved from dock to cars by means of a hand or a power lift truck, and could remain on the skids until delivery at destination. Savings as high as 80 per cent have been recorded in loading cars with freight on skids as compared with handling freight in packages. These large savings are due to the combination of the saving of a handling that involves a picking up and a putting down operation and a handling involving a horizontal movement or haul. In the first case the handlings are reduced by combining many small units into a few large units; in the second case the handling is done quicker and at less cost by means of mechanical equipment.

The Champion Coated Paper Co. formerly took three hours to load packages of paper into a car. By loading their paper on skids, they cut this operation to 45 minutes. The general stores department of the Illinois Central railroad loads a car with 25 tons of castings packed on skids so quickly, that if they were paying the 90-cent wage rate paid stevedores on the Pacific Coast, the cost per ton

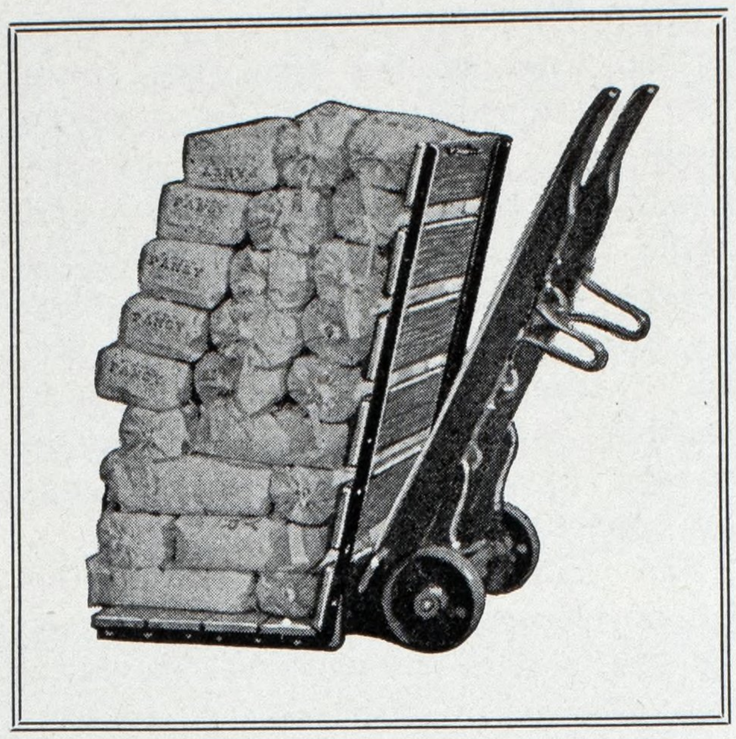
SHIPMENT OF CASES ON A LIVE SKID

would be somewhat less than 3½ cents.

Rehandlings are avoided by various methods besides the use of skids and lift trucks. In the first place, the best way of applying the principle of keeping the freight off the floor of the dock is not to put the freight on the dock. This not only saves handling but in many cases reduces costs by reducing congestion. Direct loading from lighter, car float or car, avoids these expenses. In one instance unloading a carload of freight from lighter to dock cost 71 cents a ton. By loading direct into the ship this expense was eliminated. When this method is not practicable, then efforts should be directed to reducing handling on the dock to a minimum by one or more of the accepted methods.

One of the accepted methods is to make up the slingloads of sacked goods as the freight is received, instead of making up the slingload when the ship starts to load. This saves one handling. The slingloads are carried to the ship's side by a tractor equipped with a crane. While the freight is not actually kept off the floor of the dock, the result is practically the same. With the same basic idea in mind, boxed automobiles are raised from the floor of the lighter or dock by pieces of lumber which permit placing the sling under the box without rehandling it.

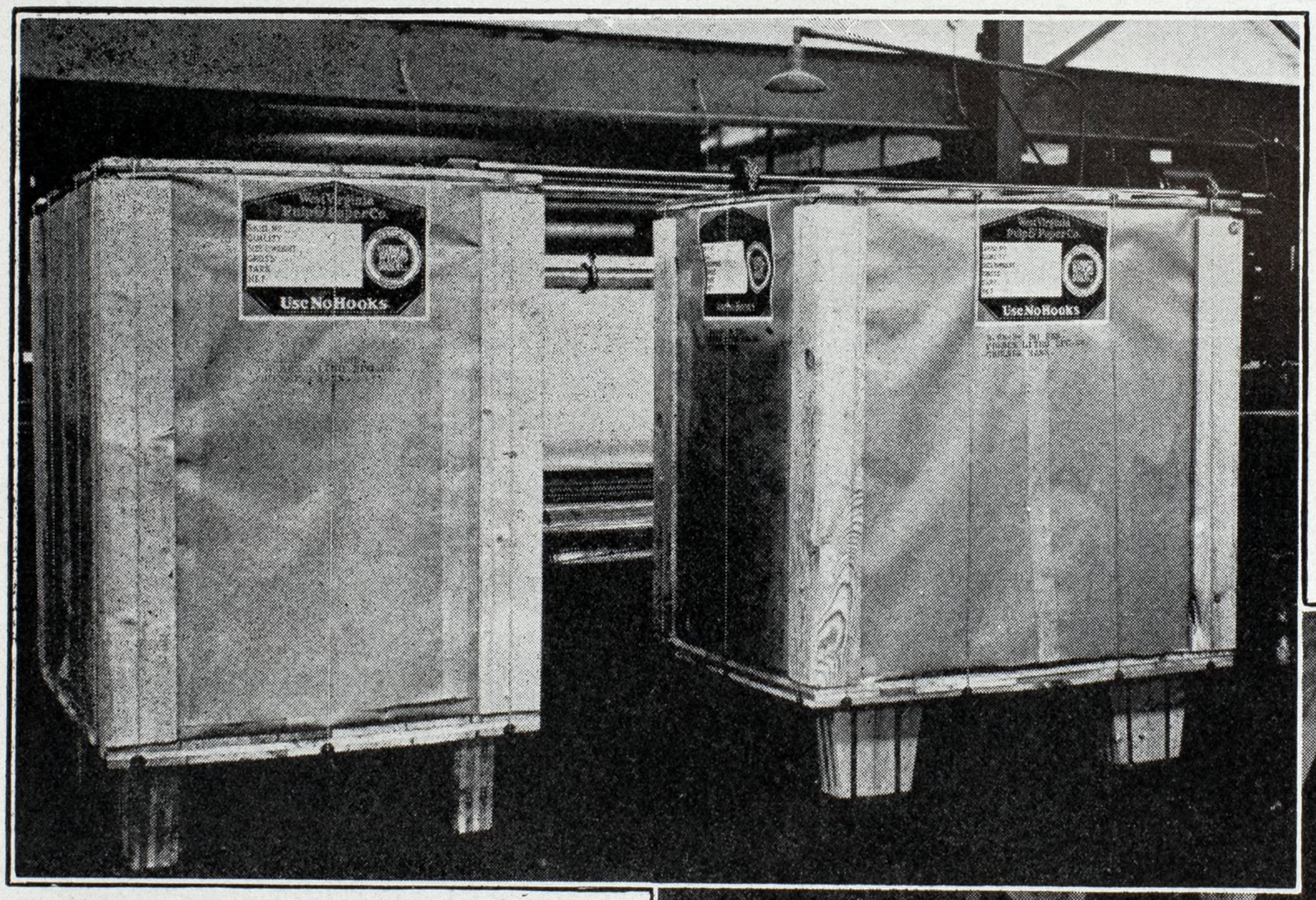
Another method is the use of a removable body or tray for two-wheel hand trucks. These are fitted with runners 1¼ inch high which raise the bottom of the tray off the floor. As the freight is received, it is placed on the tray and remains there until ready to be moved to the ship. When the freight is to be moved, the blade of the hand truck is pushed under the bottom of the tray and by means of a handle, the load is pulled back onto the hand truck. This saves one handling and also results in an increased load of 100 per cent or more. This method is used on some of the docks of the Clyde line, Munson line, United Fruit line, Old Bay line and others at various ports.



REMOVABLE BODY FOR HAND TRUCK

Skids moved by power lift trucks are used to keep the freight off the floor of the docks by the American South African line and the American-Hawaiian line at New York and the Munson line at New Orleans. The Colombian line at Barranquilla, Colombia and the Morgan line of the Southern Pacific at New York extends this method by carrying the freight into the ship but there it is placed on the deck. The Detroit and Cleveland line extends the use of the skid by carrying about 40 per cent of its cargo on skids between terminals. Automobile batteries are received on special skids at Cleveland and remain on this skid until arrival at the automobile factory in Detroit.

The New York Central uses skids and power lift trucks on its docks at Weehawken, N. J. In the transfer of a car of sacked goods from a railroad freight car to a lighter, the following handlings were formerly involved: 1, floor of car to truck; 2, truck to floor of railroad dock; 3, dock to track; 4, truck to lighter. Now the freight is unloaded to skids and remains on the skids until the shipment is ready to be loaded on a lighter, thereby reducing the handlings to two. Handlings will be still further reduced in the near future by keeping the freight on skids until the lighter is unloaded at the steamship terminal. This will increase the economies obtained by the New York Central and, in addition, reduce the cost of loading from lighter into ship. Terminal operating costs have been reduced 14 per cent, claims have been less and the turnover of floating equipment has been increased. In addition, the railroad company has received increased shipments of sacked



PAPER SHIPMENTS ON TEMPORARY SKID

SHIPMENTS OF SACKED GOODS ON SKIDS AT WEEHAWKEN TERMINAL, NEW YORK CENTRAL RAILROAD

goods because there is less liability to damage when the freight is kept off the floor of the dock.

Hand-lift trucks, or hand jacks, as they are sometimes called, are used on the docks of the Eastern Steamship Co., the Hudson River Night line and other sound and river lines for handling inter-plant shipments of paper on temporary skids. The two lines named haul the skid and lift truck with an electric tractor. Allowing for repairs, capital charges on the tractor for the time it is used, and full charges on the lift truck, the Eastern Steamship Co. has cut handling costs 40 per cent as compared with the same costs for shipments in cases.

The Catskill Evening line operating on the Hudson river, receives shipments of cardboard on permanent skids. At the mill the carboard is placed on these skids without packing or strapping. The skids are carried by motor truck to the steamship terminal and from there shipped to the New York dock where delivery is made to consignee. On the return trip these skids are loaded with groceries and other cargo. Bundles of paper are handled in the same manner. The ownership of the skids is equally divided between the steamship company and the shipper.

FREIGHT ON TRAILERS AT THE BOSTON TERMINAL OF THE EASTERN STEAMSHIP CO.

Tractors and trailers are used to keep the freight off the floor of the dock by the Chesapeake line at Baltimore and the Eastern Steamship line at New York and Boston. The Goodrich Transit Co., the Merchants and Miners Transportation Co., the New England Steamship Co., and the Hudson River Night line in addition to using trailers to keep the freight off the floor of the dock, also use trailers to keep freight off the ship's deck.

Unnecessary handling of freight is expensive. By keeping the freight off the floor of the dock and the deck of the ship, and by combining small packages into fewer and larger units, handling can be reduced to the minimum. By reducing handling to the minimum, costs are cut from 12 per cent to 50 per cent and more. The steamship companies used in this article as examples applying these newer methods, and using mechanical equipment, have found the results extremely profitable, and are willing to pass on their experiences to other companies who desire similar economies.

Use Welding In Fabricating Rudders

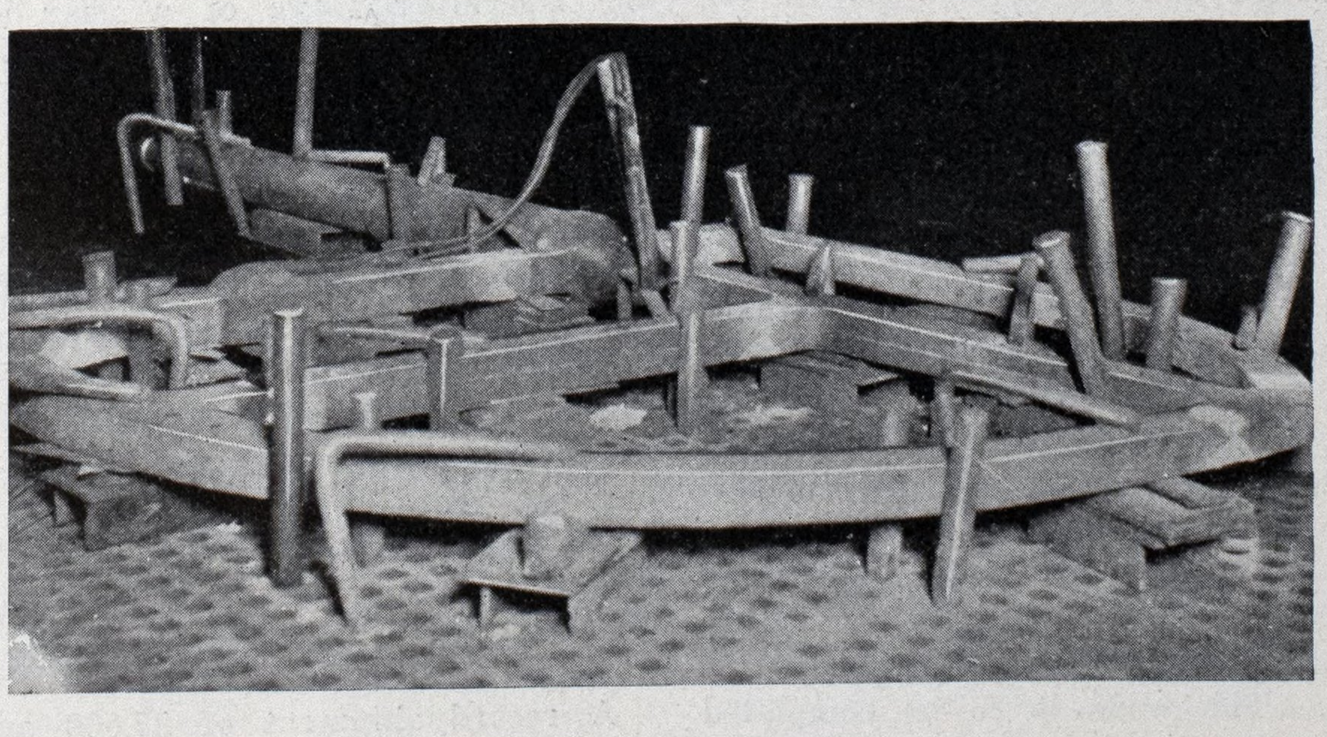
A FERRYBOAT rudder is a heavy thing. It must be in order to withstand the work of swinging one of these heavy craft against tides, currents, and its own momentum.

Most of the rudders are not solid, but are made with a framework of heavy forged bars, to which steel cover plates are fastened on each side, the space in the center being filled with wood.

From the accompanying illustration it is apparent that several joints have to be made in fabricating the rudder frame. It is about eight feet square. This phase of the work was formerly handled by the blacksmith and his helpers. As the frame members are 4 inches by 4 inches iron bars, this was no easy job. In fact, it took a blacksmith and three helpers more than a week to make the seven joints required. Now it takes three welders only half the time to do the same work, and it is said, to do it better.

The various members are forged to shape, and the ends where the welds are to be made are double beveled to 45 degrees. Next the members are lined up on the bending floor slabs to correspond with the template. They are held in position by pins and wedges which are firmly driven into the square openings in the cast iron floor blocks.

The upper left-hand weld is made first. Then the others are made in any order, but it is usual practice to make two or three of them at the same time so as to equalize expansion as much as possible. Of course the welds are all of the double V butt type. In order to simplify alignment of the various members, all welds on one side are made first. Then the rudder frame is turned over and the reverse sides of the joints welded. The completed job is a strong and durable rudder frame.



FORGED STEEL MEMBERS OF FERRYBOAT RUDDER FRAME CLAMPED IN PLACE ON BENDING SLABS—READY FOR WELDING

Up and Down the Great Lakes

Self Unloaders—Lake Levels—Order Bulk Freighters—Build Lake Boats —Harbor Plan Proposed—Barge Contract—All Cargo Records Broken

PROSPECTS of reviving the Lake Calumet industrial harbor project were given new life when the Chicago city council recently adopted a resolution authorizing a comprehensive Chicago harbor plan. The resolution included the barbor report of the Chicago Commercial club, drawn up a year ago by Maj. Rufus W. Putnam as a basis for the new plans, which will be prepared by the council committee on harbors, wharves and bridges and the city's engineering department.

For 20 years the Calumet harbor project has been under consideration. The joint city-Nickel Plate railroad contract ordinance was rejected on the return to power of the administration of Mayor William Hale Thompson. A new plan was presented and the mayor appointed a commission of South Chicago citizens to put it into effect. Legislation was obtained in 1927, the state assembly knocking out the basis for the Nickel Plate ordinance and providing for a $4,000,000 special harbor tax fund to finance the mayor's plan. Difficulties beset the progress of the plan, however, when it was found that the $1,200,000 appropriation for work in 1929 must be taken from the overloaded corporate fund. Since last November, the plan had remained quiescent.

Self Unloader Vessels for Great Lakes

Marked activity is evident in the conversion of existing ships and the building here and there of new self-unloading ships. The Leathem D. Smith Dock Co., Sturgeon Bay, Wis. now have under way the reconstruction of the steamer, SIERRA, 8000-ton lake freighter, 438 feet long, 52 feet beam and 28 foot depth, into a self-unloader. The vessel will be operated as a unit of the Tomlinson fleet in handling coal, sand and coal principally. This vessel is the fourteenth to be equipped with this particular system of self-unloading. New boilers are also being furnished by the same yard. The work is to be completed by April 15 and the total construction cost will amount to $275,000.

The steamer EMPIRE CITY, also operated by the Tomlinson fleet, Cleveland, is to be converted into a self-unloader using the same system. This steamer is of 6200 tons cargo capacity and is 408 feet long, 48 feet wide and 28 feet deep. She will be equipped with two 10-yard scrapers, a 60-inch incline belt, a 54-inch boom conveyor 140 feet long and will have an unloading capacity of 1250 tons per hour.

In the case of this vessel, machinery and plans will be furnished by the Leathem D. Smith Dock Co. and the steel construction and installation work will be carried out at the Lorain plant of the American Ship Building Co. The vessel is to be ready for operation by the opening of navigation. When completed the Tomlinson fleet will have four self-unloaders, the other three being the SIERRA, SINALOA, and E. M. YOUNG.

December Lake Levels

The United States Lake Survey reports the monthly mean stages of the Great Lakes for the month of December as follows:

Lakes	Feet above mean sea level
Superior	603.00
Michigan-Huron	580.63
St. Clair	574.98
Erie	571.74
Ontario	245.80

Lake Superior was 0.39-foot lower than in November and was 0.68-foot higher than the December stage of a year ago. Lakes Michigan-Huron were 0.02-foot higher than in November and they were 1.85 feet higher than the December stage of a year ago, 1.45 feet above the average stage of December of the last ten years. Lake Erie was 0.01-foot higher than in November and it was 0.13-foot higher than the December stage of a year ago. Lake Ontario was 0.13-foot higher than in November and it was 0.15-foot higher than the December stage of a year ago, 0.68-foot above the average stage of December of the last ten years.

Large Auto Shipment

A record shipment of 27,000 automobiles and trucks from Cleveland and other automobile shipping points to Duluth, was made in 1928, according to dispatches from that place. The preceding mark, made in 1927, was only 9000.

The bulk of these shipments, which it is said saved auto shippers some $2,000,000 in freight charges was handled by the Great Lakes Transit Corp., the Minnesota-Atlantic Transit Co., and the Western Transit Co.

Order Bulk Freighters for Great Lakes

Contracts were let Jan. 16 by the Pittsburgh Steamship Co. for construction of three bulk freighters which will add 36,000 tons to the trip capacity of the large ore carrying fleet of this company.

The American Ship Building Co. is to build two of the vessels at its Lorain yard. The other boat is to be built by the Great Lakes Engineering Works at its River Rouge plant.

Two vessels are to duplicate the A. F. HARVEY, built in 1927 for the Pittsburgh Steamship Co. with three scotch boilers. The one building at the Great Lakes Engineering Works plant is to have two Babcock & Wilcox water tube boilers.

The three vessels are to have a 580-foot length at keel, a beam of 60 feet and a 32-foot depth. They are each to have 18 hatches, 12 feet wide and 24 feet at center. The vessels are to be equipped with the latest type machinery and are to be modern in every detail. They are to conform with American shipping bureau's highest classification for lake service. They are to have 12,000 tons capacity each. Delivery of the vessels is scheduled for midsummer.

The work at the Lorain yard of the American Ship Building Co. will probably mean taking on 800 more men, according to officials of the company.

Build Twelve Freighters

According to L. A. France, assistant trade commissioner of Montreal, 12 new freighters are to be constructed during the year by the Canadian Terminal System of Toronto. The company has called for bids for construction of six large upper lakes freighters of the GLENEAGLES type and six canal size freighters.

Harbor Plan Is Proposed for Cleveland Port

The question of what to do with Cleveland's harbor has been up for years and City Manager Hopkins has given the matter a good deal of attention. In this connection he invited Dr. R. S. MacElwee, commissioner of the port of Charleston, S. C. to make a study and to report on Cleveland's lake front and port problem. Dr. MacElwee has now made his report. In this report he recommends a harbor with separate divisions for industrial and commercial traffic. The former division to be financed by the industries it will serve or financed by the municipality and sold to the industries. He gives approval to the construction of a lake front boulevard.

A port belt line is considered essential to connect all wharfs with every railroad entering the city. This line should be owned by the port commission but not necessarily operated by it. The commercial part of the port it is pointed out must have facilities to serve three kinds of traffic; general cargo or package freight in the Great Lakes trade; building materials and other bulk commodities that need no protection; and eventually ocean freight for general cargo liners in overseas commerce after the canalization to proper depth of the St. Lawrence waterway.

The report recommends the creation of a port commission as a department of the city government. This port commission should be in charge of a director at a salary of from $10,000 to $18,000. A chief engineer should also be appointed.

Contracts for Barges

The Riter-Conley Co., Pittsburgh has been awarded contract for four self-unloading cement barges from designs prepared by T. R. Tarn, naval architect of Pittsburgh. The Pittsburgh company received the order from the Marquette Cement Mfg. Co., Chicago, which operates plants at La Salle, Ill., and Cape Girardeau, Mo.

These barges are each to be 175 feet long, 35 feet beam and 8 feet depth with a carrying capacity of 800 tons in three hoppers, each of which is to be 144 feet in length. The barges are to cost about $12,000. They are to be placed in operation on the Mississippi river between Cape Girardeau and Memphis where docks for loading and unloading are being constructed. Word from the company carries the information that it has plans providing for the construction of a 700-horsepower twin screw diesel tug.

The tug NEBRASKA, new vessel for the Great Lakes Towing Co., was launched Jan. 4 at the Jefferson Street shipyards, Charles H. Dimmers, superintendent of the yards supervising.

The NEBRASKA is steel, 84 feet long at keel and powered with an 800-850 horsepower engine. The box is 26 by 28 inches. The vessel was constructed entirely at the yards of the company.

Bulk Cargo Movement Breaks All Records

ALL previous records for total bulk cargo movement on the Great Lakes were broken in the year 1928. This was accomplished not by the addition of new vessels but by more efficient operation of the existing fleet. Quicker turn-arounds were maintained on the average than before. The actual period of operation was shorter. It is interesting to note from the accompanying table showing cargo movement for the past 10 years that there was an increase in every commodity, iron ore, coal, grain and stone, the gain in the two last being particularly noteworthy. The increase in all commodities for 1928 over the year 1927 is more than six and a half million short tons.

Lake Vessel Launched

The first of several lake and canal vessels for Canadian owners was launched Jan. 10, at the Wallsend yard of Swan Hunter & Wigham Richardson Ltd. The new vessel is being built for J. J. Boland Jr. and Capt. Robert Scott Misener, both of Canada. Her length is 253 feet.

Harbor Improvements on Great Lakes

The channel in Howard's Bay, a half-mile long, leading from the mouth of the bay to Tower Bay was deepened to 20 feet during May and June. Dredges removed 36,000 yards there. Dredging of the St. Louis river to Big Island removed 142,000 cubic yards and increased the low-water depth to 20 feet. The concrete pier on the south at the Superior entry was repaired for 400 feet. The total expenditure on this Duluth-Superior harbor was $9,000,000.

At Ontonagon, it is expected that the annual dredging of the habor will be carried out. It has been the custom in recent years to maintain, a 15-foot channel inside the piers and 17-foot channel outside. It requires the movement of some 80,000 yards.

At Keneewaw Waterway, Mich., a revetment to the extent of 2000 linear feet was repaired. Damage to superstructure and decay of small stone on the east breakwater was replaced by concrete capping blocks. The east breakwater, of the upper entry was repaired for 250 feet.

Capt. J. B. Lowe Dies

Capt. James B. Lowe, a successful navigator who had many friends in the lake trade, died Jan. 22, of heart trouble at his home in Lakewood, O. He was 73 years of age and had sailed lake vessels for 42 years.

Beginning his lake service in 1881 with the Wilson Transit Co., he became associated with the Cleveland-Cliffs Iron Co. in 1890, afterward buying a a number of steamers of the latter fleet.

From 1905 until 1916, he was in the employ of the Mitchell fleet.

Bulk Cargo Movement—1928

Shipments on the Great Lakes for Last Year Compared with Nine Preceding Years

Year	Iron ore, gross tons	Coal, net tons	Grain, various kinds, net tons	Stone, net tons	Total, net tons
1928.....	53,980,874	34,823,002	16,372,116	15,677,551	127,329,348
1927.....	51,107,136	34,794,291	14,692,536	14,033,376	120,760,195
1926.....	58,537,855	31,011,544	12,087,316	12,628,244	121,289,502
1925.....	54,081,298	28,127,359	13,320,346	11,351,948	113,370,707
1924.....	42,623,572	25,860,515	15,222,787	9,225,624	98,047,327
1923.....	59,036,704	33,137,028	11,850,446	9,920,422	121,029,004
1922.....	42,613,726	19,868,925	14,267,020	7,592,137	89,454,848
1921.....	22,300,726	26,660,652	12,470,405	3,925,705	68,033,575
1920.....	58,527,226	26,409,710	6,736,348	7,821,980	106,518,531
1919.....	47,177,395	26,424,068	6,091,703	6,407,285	91,761,238
1918.....	61,156,732	32,102,022	6,548,680	7,467,776	114,614,018

Personal Sketches of Marine Men

H. B. Walker, President, American Steamship Owners Association

By E. C. Kreutzberg

Photo by Harris & Ewing

HE HAS demonstrated to the individual shipowner the value of co-operation. By tact and initiative he has welded the American Steamship Owners association into a unit as an influence in marine affairs.

MORE than 40 years' service, in many capacities, the last 19 years as president, with one of the oldest of the coastwise steamship companies has given him a thorough knowledge of all phases of ship management.

LOOKING forward and building on a solid foundation of good service and efficient operation he is continuing to coordinate the efforts of American shipowners to establish the American flag on the ocean trade routes.

ON THE opinion of private owners of American merchant vessels, no man deserves more credit for the formulation and enactment of the law known as the Jones-White bill, or the merchant marine act of 1928, than H. B. Walker, president of the American Steamship Owners' association. Mr. Walker spent much time and effort in marshalling facts having a bearing on the welfare of the American merchant marine, and in presenting them for the consideration of the house committee on merchant marine and fisheries. Many of his specific recommendations are embodied in the Jones-White act. Foremost of these is the provision by which contracts for the carriage of United States mail are awarded to American vessel owners, thus paving the way for the upbuilding of our merchant marine out of moneys laid out by the United States treasury. The postmaster general of the United States already has awarded mail contracts which have caused American ship operating companies to order new ships from American shipyards, and the placing of much additional business of this character now is in prospect and the effect is sure to be helpful in building up a substantial privately owned merchant marine.

Mr. Walker believes that the task of fostering the American merchant marine is only partly accomplished. He believes that some aid also is necessary to encourage the American owner of cargo carriers to replace these boats, when necessary, with vessels built in American yards. He directs attention to the statement of the navy department that, in the event of war, 30 per cent of America's naval strength would be comprised of the vessels in her merchant marine. Mr. Walker now is engaged in the organization of an effort to obtain co-operation from the government which will encourage the building of more cargo vessels to be operated under the American flag.

Herbert B. Walker was born in Philadelphia in 1869, the son of a seafaring man, Capt. George M. Walker. The family moved to Brooklyn where Mr. Walker spent his childhood. He received his education in the public schools of Brooklyn and went to business college there. At the age of 15 he went to work as an office boy for the Old Dominion Steamship Co., in whose service he rose gradually until in 1907, he was elected president of that line. During his incumbency of that office he won a reputation as an able ship operating executive. He held this office until 1926, when he was elected president of the American Steamship Owners' association. In this capacity he has won the respect and full confidence of the ship owners of this country. This association has about 50 members, who own 3½ million gross tons of ocean and coastwise shipping, comprising about 80 per cent of the privately owned American merchant marine. As one of its members says, Mr. Walker runs the whole show in this association. He has shown singular tact and initiative, and has won recognition for his ability to secure smooth and frictionless co-operation.

Mr. Walker has his headquarters at 11 Broadway, New York, having his desk in one corner of a big room where the association has its meetings. He spends most of his time at his work and has few recreations. His residence is at 575 Park avenue, New York.

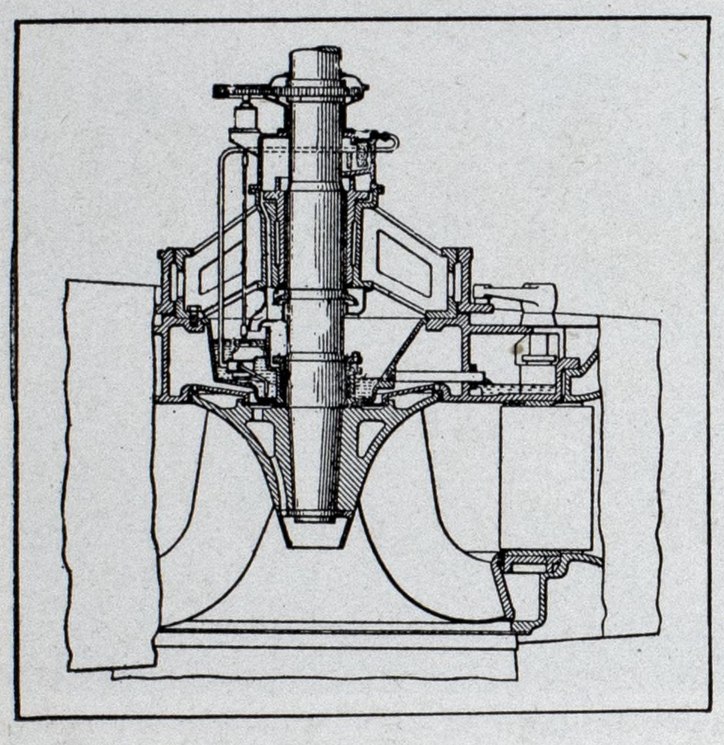
Patents Show Marine Development

Latest Marine Inventions Described

Specially Prepared for Marine Review
By Richards and Geier

Patent Attorney's, 274 Madison Avenue, New York

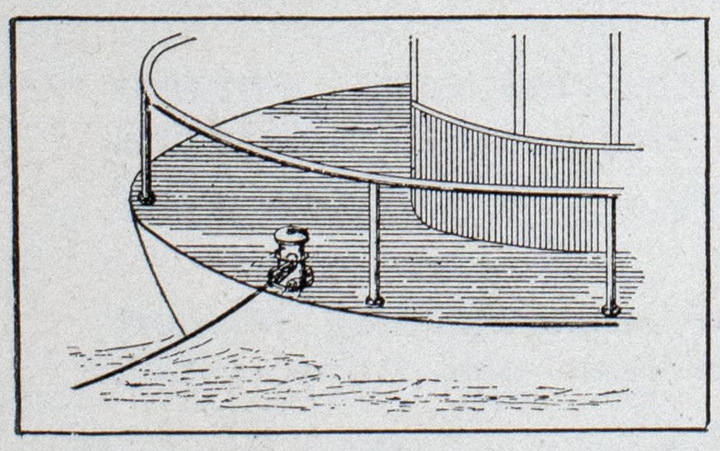
THE principal object of this new hydraulic turbine bearing is to provide a combined oil and water pan having a compartment adapted to receive the oil as it flows from the main turbine bearing and having a compartment into which the water leaking from the turbine casing through the seal is caused to flow, the oil and water being kept separated and confined respectively to certain channels.



OIL AND WATER CONTROL FOR HYDRAULIC- TURBINE BEARINGS

U. S. patent No. 1,693,600. William F. Grant, Newport News Va., assignor to Newport News Shipbuilding & Dry Dock Co. Filed March 9, 1928. Serial No. 260,447.

AN OBJECT of the invention is the provision of a bitt formed of any suitable metal and having a transverse passage, elliptical in cross section through which a rope, line or bight on the end of a line is inserted and then engaged around the bitt for positively retaining the end of the line or rope in position, the construction of the bitt being such a nature that the rope or line may be readily connected to the bitt.

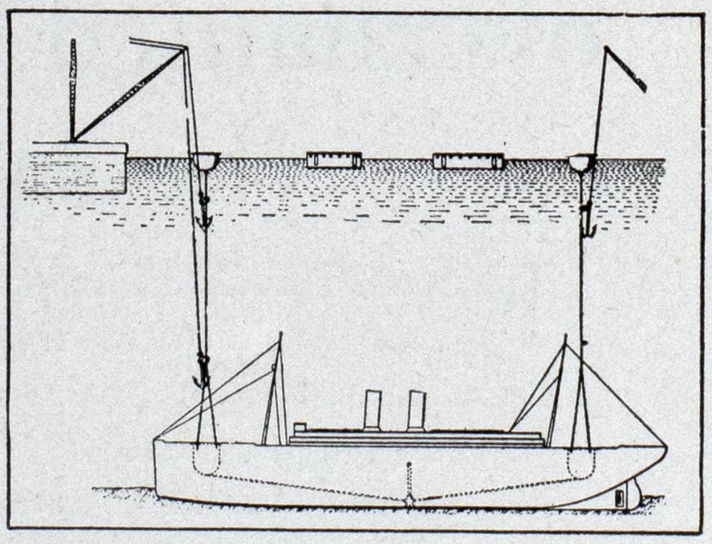


BITT

U. S. Patent No. 1,694,312. James Henry Clark, Miami, Fla. Filed March 9, 1928. Serial No. 260,321.

WE HAVE made arrangements with the patent attorneys Richards & Geier, to publish data relating to letters patent issued in the United States covering inventions which may be of particular interest to our readers. The patents described, some of which have accompanying cuts partially illustrating the inventions, are all of recent date and we are planning, in subsequent issues, to publish similar information on patents pertaining to various phases of marine development work. Should our readers be interested in obtaining a printed copy of any of the patents appearing in this issue, or any other patent desired, such copies may be had by addressing request to the editor or directly to the contributors of this page.

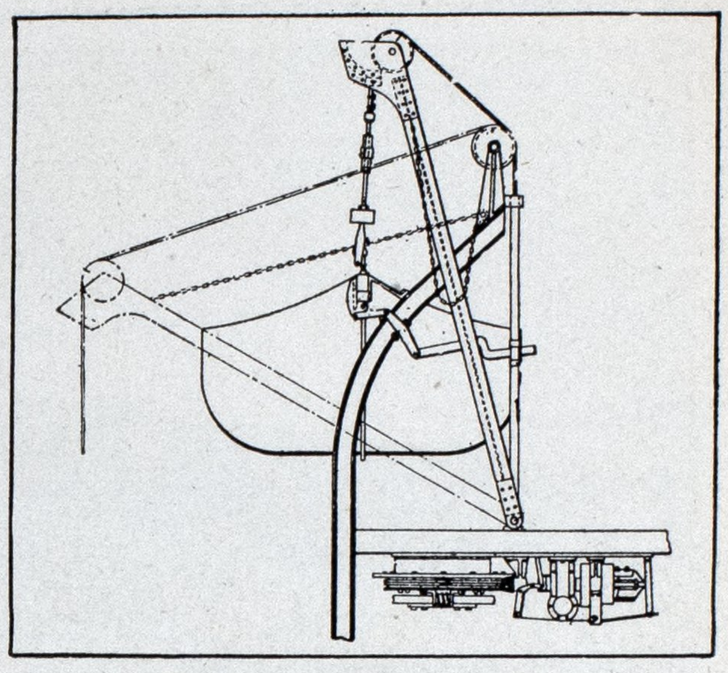
THE present invention is concerned with the provision of improvements in ships, particularly with the provision of a ship which may be readily located for salvage purposes if it sinks, and which is provided with means for readily guiding the lifting lines from floating cranes or the like into proper engagement with the submerged vessel when it is desired to raise the ship.



SHIP

U. S. patent No. 1,696,053. Jerome Pasini, New York. Filed June 3, 1927. Serial No. 196,312.

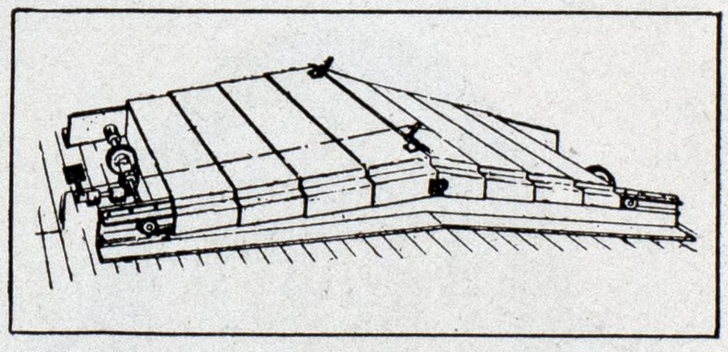
THE invention relates to davits for carrying, raising, and lowering lifeboats; and the object of the invention is to provide davits comprising curved supporting members extended inward over the deck and arranged to support the lifeboat in the normal position, boom members being pivoted at their lower ends to the deck and arranged to swing outward on their pivots to lower the lifeboat.



DAVIT FOR LIFEBOATS

U. S. patent No. 1,691,245. Arthur W. Lyda, North Canton, O., assignor to The American Safety Navigation Co., Canton, O. Filed Oct. 12, 1926. Serial No. 141,068.

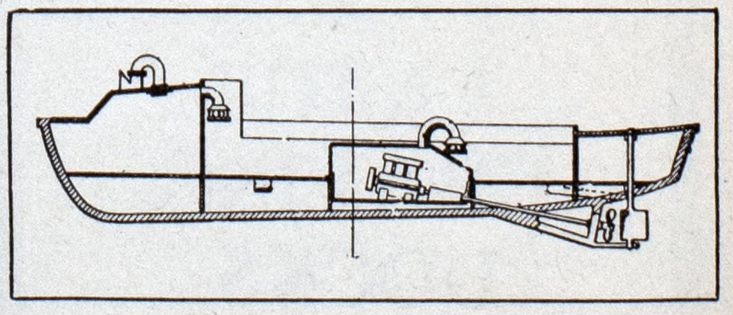
THE purpose of this invention is to provide an improved hatch cover for vessels and for use in closing floor openings in situations corresponding to those of the hatches in the deck of a sea-going vessel as in warehouse floors.



HATCH COVER

U. S. patent No. 1,692,782. James F. Mackin, Chicago, assignor to Charlotte K. Mackin, Chicago. Filed Jan. 29, 1927. Serial No. 164,406.

THIS invention has for one of its objects to provide boats of the smaller type with a portable, watertight engine housing equipped with ventilators which normally permit a free inflow of air, but which will automatically close to prevent the entrance of any water which might break over the craft or reach the ventilator.



ENGINE HOUSING

U. S. patent No. 1,694,790. Fred N. Nelson, Seattle. Filed Sept. 10, 1924. Serial No. 736,-852.

Late Decisions in Maritime Law

Legal Tips for Shipowners and Officers

Specially Compiled for Marine Review
By Harry Bowne Skillman
Attorney at Law

THE voyage on which it was contemplated to carry at the time of shipment can be shown by extrinsic evidence, and the carrier's advertisements may be shown to determine the voyage contemplated. A ship, having exercised her option of proceeding by one of two routes and commenced her voyage, was bound to proceed upon the course she had selected, according to the opinion in the case of General Hide & Skin Corp., v. United States, 24 F. (2d) 736, and by breaking its warranty not to deviate, the owner of the ship became the insurer of the cargo and liable for all damages occasioned to the consignee.

* * *

INTEREST on damages sustained in consequence of collision is ordinarily computed from the date of the collision, or from the date when the expenditures for repairs became payable.—NORTH AMERICA, 24 F. (2d) 846.

* * *

A CARGO owner, who chartered a vessel under a time charter, under which possession and control of the vessel were reserved to the owner, was entitled to a lien on the vessel for any unjustifitable loss or damage to his cargo, under the well-established rule that the vessel is bound to the cargo and the cargo to the vessel.—FORT GAINES, 24 F. (2d) 849.

* * *

THE Harter act does not apply of its own force to a private contract of carriage, but where it has been expressly incorporated in a charter it thereby becomes applicable to all its terms and reduces the otherwise absolute warranty of seaworthiness to an obligation to use due diligence only. The kind of due diligence which is required by the Harter act comprehends something more than a mere casual inspection.—AGWIMOON, 24 F. (2d) 864.

* * *

THOUGH notice of claim for damages was not required by ocean bill of lading to be in writing, it was not sufficient, said the court in the case of COMMERCIAL GUIDE, 24 F. (2d) 868, that the carrier be apprised of the damage, but it must also have been notified of the intention to hold it liable.

* * *

NO DIFFERENCE exists, as to unseaworthiness, between private and common carriers, or as to whether a cargo consists of merchandise or passengers, since, in each instance, a seaworthy boat must be used. A boat must be fit to carry her passengers for the particular transportation; for, if she lacks reasonable fitness, staunchness, and sufficiency, she is unseaworthy. Regardless of the vessel's strength and size, or the purpose for which she is navigated, she is required to exercise reasonable care in construction and equipment to avoid injury to her passengers. A high degree of care and precaution is necessary in her navigation to avoid dangers from contact with ice. Mere seaworthiness in ordinary weather and conditions is manifestly not the sole factor in estimating a vessel's fitness. She must be fit to carry her passengers, freed from anticipated perils, and ferrying in winter, when ice fields are to be expected, not only involves terrible loss of lives, but requires, on the part of the owner's responsible agents, the exercise of the utmost care to afford protection.—LINSEED KING, 24 F. (2d) 967.

* * *

THE law of general average is a part of the law of the sea, as distinguished from the law of the land. Perhaps the necessity for such distinction was that there are all shades of ferocity in the vast and cunning sea which Jean Bart called 'the great brute.' It's the claw's scratch with intervals of velvet pawing. It's never fiercer—the sea—than when a pond, a pool of liquid lead. Gloomy immobility: the prelude to storms, tempests, and hurricanes, which sweep over the face of the waters with the fury of charging Cossacks over the snow-crusted steppes of Russia.

"The maxim of the Rhodian law, the foundation of general average, did not in terms extend further than to cases of jettison (Jonah is a chapter in its history) but the principle applies to all other cases of voluntary sacrifice, properly made, for the benefit of all. The maxim itself is probably an imperfect statement in writing of the principle known to the common law of the seas, illustrating the general principle by a perfect example.

"The rule for contribution in general average is a rule both of equity and policy which has come down through the centuries and entered into the general maritime law. It has been preserved in England without enforcement by statute."—NORTHERN No. 30, 24 F. (2d) 975.

* * *

NO MARITIME lien exists against a vessel for supplies or materials necessary for construction or equipment, put on the vessel before she sails. It follows, it was decided in the case of MINNIE V., 24 F. (2d) 604, that a mortgagee of a vessel is not a maritime lienholder, and cannot share in the proceeds of a forfeiture sale of the vessel engaged in the liquor traffic.

* * *

IT HAS been the maritime law from the time of Oleron, declared the court in the case of United States v. Laflin, 24 F. (2d) 683, that agreements, by which seamen, engaged in a fishing or whaling voyage, are to receive for their services shares of the profits of the voyage, are contracts of hiring, and the shares so agreed upon are in the nature of wages, to recover which actions may be maintained after the end of the voyage. Sailors who have a certain lay or share in the proceeds as wages are never regarded as partners with the owners, though they may participate in the profits of the voyage.

* * *

WHERE both vessels privately owned are at fault in a collision, the colliding vessel is responsible in full to the cargo owners of the carrying vessel, with due regard to the provisions of the Harter act, but the colliding vessel may recoup one-half of the amount from one-half of the amount of damages to the carrying vessel.—In re United States Steel Products Co., 24 F. (2d) 657.

* * *

SEAWORTHINESS involves no more than a reasonable fitness for the purposes of the voyage.—In re Gravel Products Corp., 24 F. (2d) 702.

* * *

IN the absence of agreement, the liability of a steamship company as carrier which received cots for shipment, part of which were destroyed by fire before being loaded on ship, was not that of insurer, it was declared in the case of Luckenback Steamship Co. Inc., v. American Mills Co., 24 F. (2d) 704, but there was an implied understanding, arising from common business experience, that the carrier would issue such bill of lading as it was its custom to issue to shippers in the usual course of its business, prescribing its liability. The shipper is presumed to know the law, and therefore must know that the terms and conditions on which its goods are received and transported by the carrier will be contained in a bill of lading to be issued later.

* * *

THE liability of a vessel for injuries received by a seaman depends either upon the unseaworthiness of the ship or upon her failure to supply and keep in order the proper appliances appurtenant thereto.—JOHN SHERWIN, 24 F. (2d) 710.

Harry Coulby's Career

(*Continued from Page* 42)

and liberal treatment of the ship's personnel, Coulby had gained the confidence as well as respect of the men and from that time to this there has been no labor trouble in shipping on the Great Lakes.

At the time of his death, Mr. Coulby was president of the Interlake Steamship Co., a director of the Youngstown Sheet & Tube Co., a director of the Toledo Shipbuilding Co. Inc., and chairman of the executive committee of the board of directors of the Central Alloy Steel Corp. He was a member of the Union, Mid-Day, Kirtland and Pepper Pike clubs of Cleveland. In New York, he belonged to the Metropolitan club and India House.

Harry Coulby's home in the village of Wickliffe, near Cleveland is looked upon as one of the most beautiful estates in Ohio. It is located on the ridge that overlooks Lake Erie and made of glazed white terra cotta, it is visible for many miles to the vessels plying these waters, many of them operated under his direction.

Mr. Coulby was buried in his native England, in the churchyard at Claypole. Services were held in Cleveland at the Trinity Episcopal Cathedral on Jan. 22. He had a complete life of the most active and constructive labor. He did more than any other single man to place Lake shipping on a sound foundation both for vessel owners and the great army of men who operate the greatest fleet of merchant ships in the world on inland waters.

Bids Are Requested for Three Large Cutters

The United States coast guard has sent out an official request for bids on the building of three United States coast guard cutters Nos. 50, 51 and 52. The bids are to be received until 2 p.m. Feb. 21 at which time they will be publicly opened.

The new vessels are to be built of steel of usual construction. The length over all is to be 250 feet; beam molded, 42 feet; displacement at 15-foot mean draft about 2000 tons. Propulsion will be by means of turbine electric drive with single screw, and the shaft horsepower is to be 3220. The three vessels must be completed on or before Oct. 31, 1930.

Specifications and drawings for these vessels may be obtained by shipbuilding companies from the Commandant United States Coast Guard, Treasury department, 14th and E streets, N. W., Washington. Bidders are to possess satisfactory financial resources, technical organization and plant facilities to assure satisfactory completion of vessels within the contract time.

Six New York Dockyards Are Consolidated

Six of the leading drydock companies in New York harbor have consolidated into one large company to be known as the United Drydocks Inc. The properties acquired own more than 50 per cent of the drydock capacity of the port of New York and their aggregate value is held at more than $20,000,000. E. P. Morse for many years head of the Morse Drydock & Repair Co. is president of the new organization. Associated with him in the management will be George H. Bates of the Staten Island Shipbuilding Co.

Included in this mammoth consolidation are the Morse Drydock & Repair Co., James Shewan & Sons Inc., W. & A. Fletcher Co., New York Harbor Dry Dock Co. Inc., Staten Island Shipbuilding Co. and Theo. A. Crane & Sons Co. These companies control 27 drydocks of a total lifting capacity of more than 160,000 tons.

Two Dollar Liners

Details for the construction of two fast 600-foot passenger and cargo liners with a speed of more than 21 knots are being worked out by the Dollar line with the shipping board and the post office department, according to a statement made by R. Stanley Dollar, vice president of the Dollar Steamship line on Jan. 11. In addition to the two vessels being planned, there is to be a third built later, according to Mr. Dollar.

The new ships are to have accommodations for 350 passengers and will have larger public rooms and greater deck spaces than any of the eight other vessels now being operated in the line's round-the-world service. The increase is for the purpose of making the vessels more attractive to tourists. Tentative plans mention the possibility of having airplane equipment on the vessels.

To be built in accordance with the San Francisco-Singapore mail contract held by the company the builders are to have the aid of a loan from the construction loan fund of the shipping board. The new vessels are expected to cost about $7,000,000 each.

Car Carrier Seatrain

(*Continued from Page* 26)

charges and custom duties where tariffs are based on gross weight. The losses should be less in the case of sacked goods, through shifting, and through holes made by the hooks of longshoremen and through contact with other cargo. In the new system there is diminished danger of pilferage and there is a saving in insurance due to carrying goods in sealed railroad cars.

The economic structure of the United States is so closely connected, not to say dependent upon its transportation system that any new method of moving freight which combines, safety, speed and economy is of vital importance. It is understood that the SEATRAIN is the forerunner of a fleet of similar car carriers which will in time connect many important points both overseas and coastwise.

Ask Bids on Motorship

Lee & Brinton, Seattle, naval architects, have prepared plans for the first of three steel passenger and freight motor vessels which the Northland Steamship Co. will build for its service between Seattle and ports in southeastern Alaska. The following plants are submitting bids: Lake Washington Shipyards; Winslow Marine Railway & Shipbuilding Co., of Seattle; Albina Marine Iron Works, Portland, Oreg.; four plants in San Francisco; Los Angeles Shipbuilding & Drydock Co. and the New London Ship & Engine Co., Groton, Conn. Bids will be received in Seattle in January.

The proposed vessel will be 188 feet in length with beam of 33 feet and depth of 21 feet 6 inches. She will be propelled by two diesel engines of 500 horsepower each. There will be accommodations for 56 cabin passengers. Refrigeration will be provided in all holds with the most modern cooling equipment. Speed will be 12 knots. All of the auxiliary machinery will be electrically driven including winches, capstan and windlass. The new vessel is scheduled for service about Aug. 1 next. The cost is estimated at $350,000.

The Northland Steamship Co. now operates two motor vessels to Alaska. This company was recently purchased by W. B. Foshay Co., of Minneapolis, Minn., and $1,000,000 is being set aside for the three new vessels which are to furnish improved service on a route where business is rapidly developing. Much of the cargo carried consists of frozen fish requiring considerable refrigerated space.

British Shipyard Orders

(*Continued from Page* 37)

water-tight bulkheads are provided, and the double bottom, which extends the whole length of the ship, is arranged for the carriage of water ballast, fresh water and oil fuel. The vessel has an electrical installation consisting of four diesel driven generators, each having an output of 200 kilowatts at 220 volts.

The White Star liner BRITANNIC is also under construction at Belfast and work is being expedited so that this 27,000-ton motorship may replace as soon as possible the CELTIC on the Liverpool-New York service. On Oct. 16, Workman, Clark (1928) Ltd., launched from the north yard a twin-screw sludge steamer, built to the order of the Belfast City corporation. The firm received from Andrew Wen & Co. Ltd., an order for two additional motorships of 10,000 tons for the Bank line.

As the year drew to a close, conditions in the shipping industry also improved, as can be seen from the accompanying chart of index numbers, compiled from *The Statist*, London, the November figure being the highest for the year to date. Sir William Seager, president of the chamber of shipping, has written in the *Shipping World* that the freight markets at present are healthy, but rates are not really remunerative, leaving probably under 5 per cent profit on the capital invested. On the other hand, Sir William H. Raeburn, at Glasgow, a prominent tramp owner, recently stated that the trades of the world are improving and that remunerative rates may be hoped for with regard to cargo steamers of modern design. There still is a considerable tonnage laid idle in British ports. The last figures available were for Oct. 1, giving 207 ships of 415,399 tons, as against 233 ships of 495,866 tons on July 1, 234 ships of 363,355 tons on April 1, and 212 ships of 371,674 tons on Jan. 1. The figure for Oct. 1, 1928, is, however, 142,600 tons or 52.3 per cent higher than on Oct. 1, 1927.

For the eleven months ending Nov. 30, 1928, exports of British coal were 45,870,791 tons, as compared with 47,262,788 tons in the corresponding period of 1927 and 18,987,802 tons in 1926, the year of the coal stoppage. Coal shipped for the use of steamers engaged in foreign trade in the eleven months of 1928 totaled 15,377,498 tons, as against 15,420,224 tons in 1927 and 6,891,139 tons in 1926. The total value of exports of British goods, exclusive of bullion and specie, for the first eleven months of 1928 was £774,306,299 ($3,750,000,000), as compared with £763,024,402 ($3,700,000,000) in the corresponding period of 1927 and £716,249,655 ($3,460,000,000) for 1926. As compared with 1927, there was a decrease of £6,582,346 ($31,850,000) in the value of coal exports, a decrease of £3,293,527 ($16,000,000) for non-ferrous metals and manufactures, a decrease of £2,879,651 ($14,000,000) for cotton yarns and manufactures, and a decrease of £2,667,182 ($12,950,000) for iron and steel. The most noteworthy increases in value were: £9,727,848 ($47,200,000) for vehicles, including locomotives, ships, and aircraft, and £3,492,025 ($16,950,000) for machinery.

Board Sells Nine Ships

(*Continued from Page* 32)

largest vessels in the shipping board laidup fleet. The TERRE HAUTE is a steel cargo vessel of 8758 deadweight tons.

As a part of the contract of sale the purchaser agrees to replace the present propelling machinery of the three vessels with either reciprocating engines or diesel engines. New propellers will also be placed on the vessels.

At its meeting Jan. 17, the board sold the steamers CAPITAL OF NEBRASKA, ATLANTA OF TEXAS and OKLAHOMA CITY, of 5200 deadweight tons each to the New Orleans and South America Steamship Co., New Orleans for the sum of $25,666.66 each, terms cash. The vessels will be put in service over the company's route between Gulf ports and ports of the West Coast of South America.

An offer of the Charles R. McCormack Lumber Co. San Francisco to buy the S. S. HUTCHINSON, 5200 deadweight tons for the sum of $45,000, terms 25 per cent cash and the balance in five equal annual installments was accepted. The purchaser of this ship agrees to perform certain repairs and betterments to fit her for lumber and general merchandise trade on the Pacific Coast.

An offer of the Gulf Pacific line, New Orleans, for the MINOOKA and HOUSTON, 5200 deadweight tons each, was also accepted. The price to be paid is $25,100, terms 25 per cent cash and the balance in five equal annual installments. The purchaser agrees to perform betterments to the ships at a cost of $35,000 each. The vessels will be put in service over the purchaser's route between New Orleans and the Pacific Coast.

Plan Mississippi Barge Line Extension

Tentative plans for the extension by the government of the Mississippi barge line service to the Illinois river in 1931, when the state waterway is to be completed, call for an expenditure of $3,000,000, of the approved $10,000,000 allotment to the Inland Waterways Corp., for barge and towboat equipment for the Illinois

Details of the government's tentative program are disclosed in minutes of a recent meeting of the war department appropriation subcommittee of the house of representatives in Washington, it is said. Another $3,000,000 of the same allowance would be used to equip similarly the Missouri river line in 1930, and $4,000,000 would be used during the remainder of the current fiscal year and the coming year for expansion of the Mississippi and Warrior river

Testifying before the subcommittee, Maj. Gen. T. Q. Ashburn, chairman of the waterways corporation, said: "It is my present intention to build for the Missouri river four towboats at $350,000 each and forty-five 1000-ton barges at $40,000 each, making a total of $3,600,000. For the Illinois river I would build four towboats at $400,000 each, or a total of $1,600,000, and thirty-five 1000-ton barges at $4000 each, or a total of $1,400,000.

Waterfront Project

What promises to be one of the greatest waterfront projects of recent years is that being undertaken by the Pennsylvania railroad in the building of its ship and rail terminal in Jersey City. An expenditure of $50,000,000 is under contemplation by the company.

The new project provides deadending streets near the present Exchange Place terminal of the Pennsylvania lines, exchange of the city's Bergen street pier for the Pennsylvania's pier B at the foot of Grand street and for the city's own development of a marine terminal adjacent to the Pennsylvania project.

The terminal will be located between the Erie railroad terminal and the Morris canal basin, Jersey City and includes construction of twelve 1000-foot piers, with modern terminal buildings, to include trackage facilities, directly served by trunk line railroads, consisting of the Pennsylvania, Jersey Central, Lehigh Valley, Erie, D. L. & W. and West Shore.

Three piers, each 200 feet wide and 1000 feet long, with a width of 300 feet between slips comprise the first unit, which includes a terminal building covering two blocks.

Late Flashes On Marine Disasters

Brief Summaries of Recent Maritime Casualties— A Record of Collisions, Wrecks, Fires and Losses

Name	Date	Nature	Place	Damage Resulting
Axpe Mendi	Oct. 1	Stranded	Bonavista Island	Not stated
Ariosto	Oct. 3	Struck breakwater	Trieste	Above waterline
Alice Verzone	Oct. 19	Ashore	Ocean Bight	Not stated
Antinea	Oct. 8	Aground	Bathurst	Floated
Artensis	Oct. 8	Collision	Hull	Rudder propeller
Anderson	Oct. 26	Sank	Port Jefferson	
Aghios Georgios	Oct. 15	Aground	Buenos Ayres	Not stated
Alpherat	Oct. 17	Collision	Monte Video	Port side
Ashworth	Oct. 18	Disabled	Tynemouth	Engine
Atlantis	Oct. 19	Aground	Poplar	Floated
Angelo Toso	Nov. 1	Aground	Montreal	Steer. gear
Alison	Oct. 22	Collision	Queenstown	Sank
Adolph Woermann	Oct. 24	Ashore	Nr. Torre Mozza	Floated
Arapawa	Oct. 26	Disabled	Auckland	Engines
Bons Amigos	Oct. 4	Ashore	River Mutara	Total wreck
Brockton	Oct. 17	Disabled	Lake Superior	Lost rudder
British Valour	Oct. 14	Ashore	Curacao	Bottom
Beau Bassin	Oct. 5	Fire	Port Maur	Considerable
Brazilian Prince	Oct. 24	Ashore	Victoria	Floated—bottom
Baden Baden	Nov. 7	Disabled	Key West	Machinery
Bogota	Nov. 8	Collision	Off Chester	Stem bows
Christopher Knudsen	Oct. 14	Collision	Columbia River	Damaged
Cavour	Oct. 16	Not stated	London	Starboard side
Clandeboye	Oct. 4	Struck quay	Garston	Stem
Convallaria	Oct. 4	Disabled	St. Johns	Rudder
City of Lancaster	Oct. 6	Collision	London	Starboard side
Cornelia	Oct. 23	Ashore	Fort Wadsworth	Floated
Cairntorr	Oct. 23	On rocks	Gulf of St. Lawrence	Total loss
Coelleda	Oct. 24	Fire	Cardiff	No. 4 hold
Choyo Maru	Oct. 23	Gale	Off Pacific Coast	Steer. gear
Chiswick Manor	Oct. 29	Collision	Windsor, N. S.	Amidships
Certo	Oct. 29	Ashore	Antilla	Floated
Captain Edmond Laborie	Oct. 16	Collision	Havre	Stem
City of Lincoln	Oct. 15	Disabled	Shanghai	Rudder
Castanet	Oct. 15	Collision	Bugsby Reach	Stem
C. W. Cadwell	Nov. 12	Struck obstruction	Point Edward	Wheel rudder
Canadian Ranger	Nov. 3	Fire	London	Considerable
Castleton	Nov. 9	Capsized	New York	
Californian	Nov. 8	Collision	Off Chester	Starboard bow
Daga	Oct. 1	Disabled	Kingston	Lost prop.
David C. Reid	Oct. 17	Disabled	lat. 36:50 N-lon. 38:17 W	Not stated
Despina	Oct. 3	Ashore	Nr. Fallonica	Not stated
Dardania	Oct. 11	Aground	Guldborgsund	Floated
Deepwater	Oct. 28	Aground	Sugar Loaf Point	Floated
Dietrich Hasseldieck	Oct. 21	Aground	Nr. Cuxhaven	Motors
Deputy Charles Nortier	Oct. 25	Collided wall	Barry	Stem
Eastern Knight	Oct. 14	Collision	Columbia River	Damaged
Express	Oct. 18	Collided quay	Brunsbuttelkoog	Damaged
El Occidente	Oct. 30	Collision	Galveston	Superstructure
Excelsior	Oct. 18	Fire	Rainham Creek	Not stated
Erno	Oct. 25	Aground	Oland	Floated
E. J. Berwind	Nov. 12	Aground	Fairport	Floated
Eschersheim	Nov. 3	Hvy. weather	At sea	deck rails
Flower O'Portsoy	Oct. 1	Ashore	Clonakilty	Total loss
Francis W. Smith	Oct. 20	Disabled	Barbados	Rudder
Festing Grindall	Oct. 4	Ashore	Carr Rocks	Total wreck
Farnorth	Oct. 29	Disabled	Boston	Steer. gear
Franca M.	Oct. 11	Aground	Buenos Ayres	Not stated
Forresbank	Nov. 1	Aground	Cont Island	Floated
Fisher Lass	Oct. 23	Ashore	Gorleston	Total loss
Finnanger	Oct. 31	Aground	Fult-a-Point	Floated
Flandre	Oct. 25	Disabled	Havre	Engine
Fulton	Oct. 25	Disabled	Bodo	Main steampipe
General W. C. Gorgas	Oct. 10	Aground	Seattle	Not stated
Gerona	Oct. 8	Collision	Thames	Not stated
Gypsum Queen	Oct. 29	Collision	Windsor, N. S.	Stem
Grelwen	Nov. 2	Hvy weather	St. Johns	Deck
Georgina II	Oct. 16	Explosion	Off Rabat	Sank
Hanley	Oct. 4	Collision	London	Forepeak
Huascaran	Oct. 10	Disabled	Nr. Roscoff	Machinery
Hartmut	Oct. 9	Ashore	Gisseloresand	Not stated
Helle	Oct. 9	Aground	Gothenburg	Floated
Honflueraise	Oct. 11	Aground	Ems	Not stated
Hsin Shutung	Oct. 15	Collision	Hankow	Sank
Hsing Kong	Oct. 17	Collision	Off Taku	Not stated
Hartford	Nov. 1	Ashore	Fort Warren	Floated
I. L. Bell	Oct. 20	Collision	Toledo	Damaged
Ingram	Oct. 4	Collision	Nr. Gluckstadt	Damaged
The Valssapulos Ionnes	Oct. 25	Disabled	Bermuda	Prop. shaft
Iricoupis	Oct. 10	Sank	Beirut	
Indira	Oct. 23	Stranded	Nr. Calicut	Not stated
Indrik	Oct. 25	Sank	Visby	
Ioannis	Nov. 7	Ashore	Tangler	Not stated
Iossifoglu	Oct. 25	Collision	Montreal	Damaged
Juan Manuel Urquijo	Oct. 3	Disabled	Cies Island	Tail shaft
James Stewart	Oct. 17	Collision	Montreal	Not stated
Jylland	Oct. 11	Disabled	Esbjerg	Machinery
Jalavihar	Oct. 12	Disabled	Bombay	Prop. blades
Justin	Oct. 25	Disabled	Norfolk	Machinery
Jest	Oct. 12	Fire	London	Not stated
Jonge Jacobus	Oct. 11	Disabled	Rotterdam	Engines
Johannes	Oct. 16	Collision	Off Oland	Starboard bow
James, No. 152	Oct. 25	Disabled	Holyhead	Not stated
Kenora	Oct. 17	Collision	Montreal	Not stated
Kassos	Oct. 3	Aground	Tulma	Floated
Konigsberg	Oct. 12	Ashore	Suez	Not stated
Leitrim	Oct. 4	Collision	Nr. Gluckstadt	Damaged
Leopold L D	Oct. 22	Ashore	Bermuda	Steering gear
Lord Fisher	Oct. 8	Aground	Off Soeroe Island	Not stated
Lorentz W. Hansen	Oct. 29	Ashore	Antilla	Floated
Liverpool	Oct. 14	Collision	Blackwall Reach	Damaged
Lake Benton	Oct. 25	Aground	Beaumont	Floated—damaged
Moyalla	Sept. 28	Struck wall	Liverpool	Stem
Maria Pinango	Oct. 2	Sank	Off Horta	
Mugello	Oct. 4	Aground	Nr. Hook of Holland	Floated
Marisedda	Oct. 11	Collision	Beirut	Sank
Macedonier	Oct. 8	Struck dock wall	Buenos Ayres	Plates
Mallin	Oct. 5	Aground	Dunkirk	Not stated
Montenegro	Oct. 8	Fire	Palermo	Stern deck
Mansepool	Oct. 30	Collision	Off Lizard	Not stated
Michigan	Nov. 2	Ashore	Portland	Not stated
Mosel	Oct. 18	Gale	Hamburg	Sank
Munaires	Nov. 6	Aground	Jacksonville	Floated
N. P. Clement	Oct. 17	Collision	Montreal	Not stated
Nordvard	Oct. 1	Struck rock	Foochow	Leaking afterpeak
Neptunus	Oct. 16	Collision	Off Oland	Not stated
Numidia	Oct. 30	Sank	Marseilles	
Nicator	Oct. 23	Ashore	Noirmoutier	Rudder propeller
Nadja	Oct. 25	Struck bank	Gothenburg	Rudder
Pansy	Oct. 1	Sank	London	
Parks Foster	Oct. 17	Ashore	Black River	Floated—badly
President Wilson	Oct. 15	Disabled	Genoa	Machinery
Ponce	Oct. 16	Sprang leak	Hoboken	Sank
Pickhuben	Oct. 4	Collision	Nr. Gluckstadt	Damaged
Pietro Campanella	Oct. 30	Collision	Galveston	Plates
Polyktor	Oct. 23	Collided quay wall	Cardiff	Portside
Pallas	Oct. 23	Aground	Ollinkari	Leaking
P.A.B. Widener	Nov. 9	Struck rock	Conneaut	Rudder
Panaghis M. Hadoulis	Nov. 5	Aground	White Island	Floated—plates
Palma	Oct. 26	Disabled	Hamburg	Boiler
Robert Fulton	Oct. 20	Collision	Toledo	Damaged
Ruperra	Oct. 16	Ashore	So. of Maio Island	Floated
Ryokai Maru	Oct. 3	Fire	Kobe	Considerable
Ribblemere	Oct. 8	Aground	River Taw	Not stated
Reichenfels	Oct. 25	Fire	Algiers	No. 3 hold
Schonfels	Oct. 15	Disabled	Norfolk	Engine
San Gerardo	Oct. 6	Collision	London	Not stated
Skrymer	Oct. 8	Fire	Calcutta	Not stated
Steamowna	Oct. 8	Aground	Dakar	Not stated
Stimson	Oct. 8	Not stated	Kingston	Total wreck
Seapool	Oct. 26	Struck rock	Off Cape Beale	Bows
St. Clement	Oct. 18	Aground	Shetland	Floated—propeller bottom
Stramore	Oct. 19	Collided pier	Carrickfergus	Plates propeller
Seeadler	Oct. 22	Collided locks	Kiel	Leaking
Santa Luzia	Oct. 24	Stranded	Oporto	Not stated
Skipper	Nov. 5	Ashore	Cape au Diable	Total wreck
Scalaria	Oct. 26	Ashore	Pearl Reef	Rudder
Trojanstar	Oct. 12	Fire	Off Cape Mendocino	Not stated
Taiyo Maru	Oct. 4	Stranded	Tokyo	Not stated
Thistleben	Oct. 4	Collision	London	Sank
Tricoupis	Oct. 11	Collision	Beyrout	Aground
Telamon	Sept. 25	Squall	St. Marc	Capsized
Tom	Oct. 18	Hvy weather	Gravesend	Sank
Tjikandi	Oct. 25	Stranded	Nr. Menado	Not stated
Vaarli	Oct. 16	Disabled	New York	Engine
Vesta	Oct. 3	Disabled	Esbjerg	Machinery
Vaba	Oct. 23	Ashore	New York	Floated
Vard	Oct. 16	Stranded	Middlegrunden	Floated
Vechtdijk	Oct. 13	Aground	Tambuzi Island	Floated—bottom
Venetia	Oct. 25	Disabled	Swansea	Boiler
Vinemoor	Nov. 5	Disabled	London	Machinery
Vestris	Nov. 12	Sank	Off Virginia Capes	
West Camak	Oct. 30	Disabled	Virginia Capes	Engine
William Balls	Oct. 20	Aground	Hammerfest	Stem port side floated
W. J. Filbert	Nov. 6	Collided pier	Lorain	Plates
Wallingford	Oct. 31	Collision	San Francisco	Bow
Yukondoc	Oct. 26	Collision	St. Clair River	Damaged
Yuan Ta	Oct. 11	Ashore	Hankow	Not stated
Yser	Oct. 18	Ashore	Point de l'Echelle	Total wreck
Yunghsing	Oct. 17	Collision	Off Taku	Sank
Zillah	Oct. 22	Collision	Queenstown	Port side
Zinal	Oct. 23	Aground	London	Considerable

Marine Review

Reg U.S. Pat. Off.

The National Publication Covering the Business of Transportation by Water

February, 1929

SELBALITH

The Versatile Deck Covering

LAID in any desired pattern or in one color or as merely a "sheathing," SELBALITH is truly a versatile deck covering. Being of the same material from top to bottom, it cannot "peel off."

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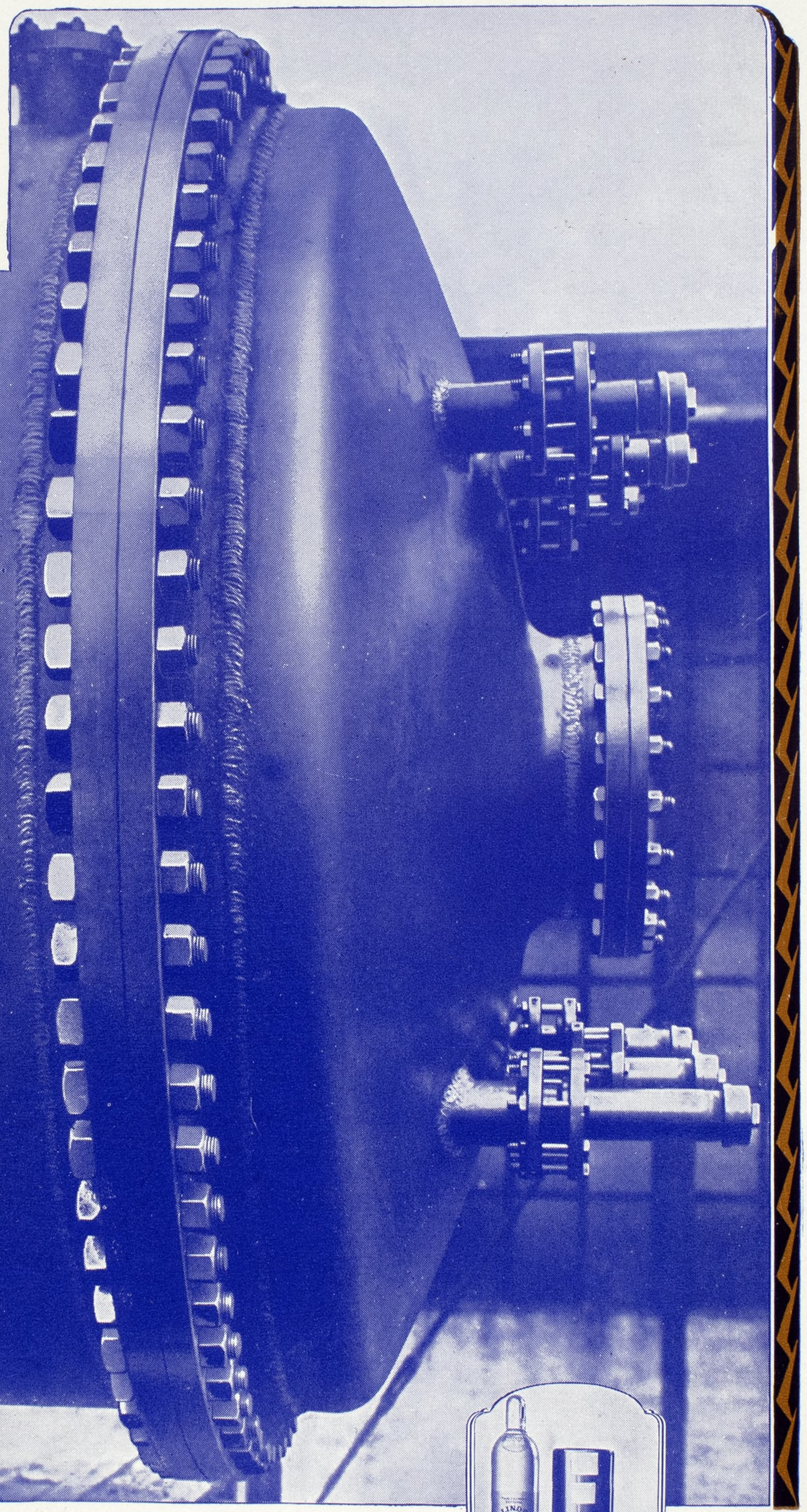

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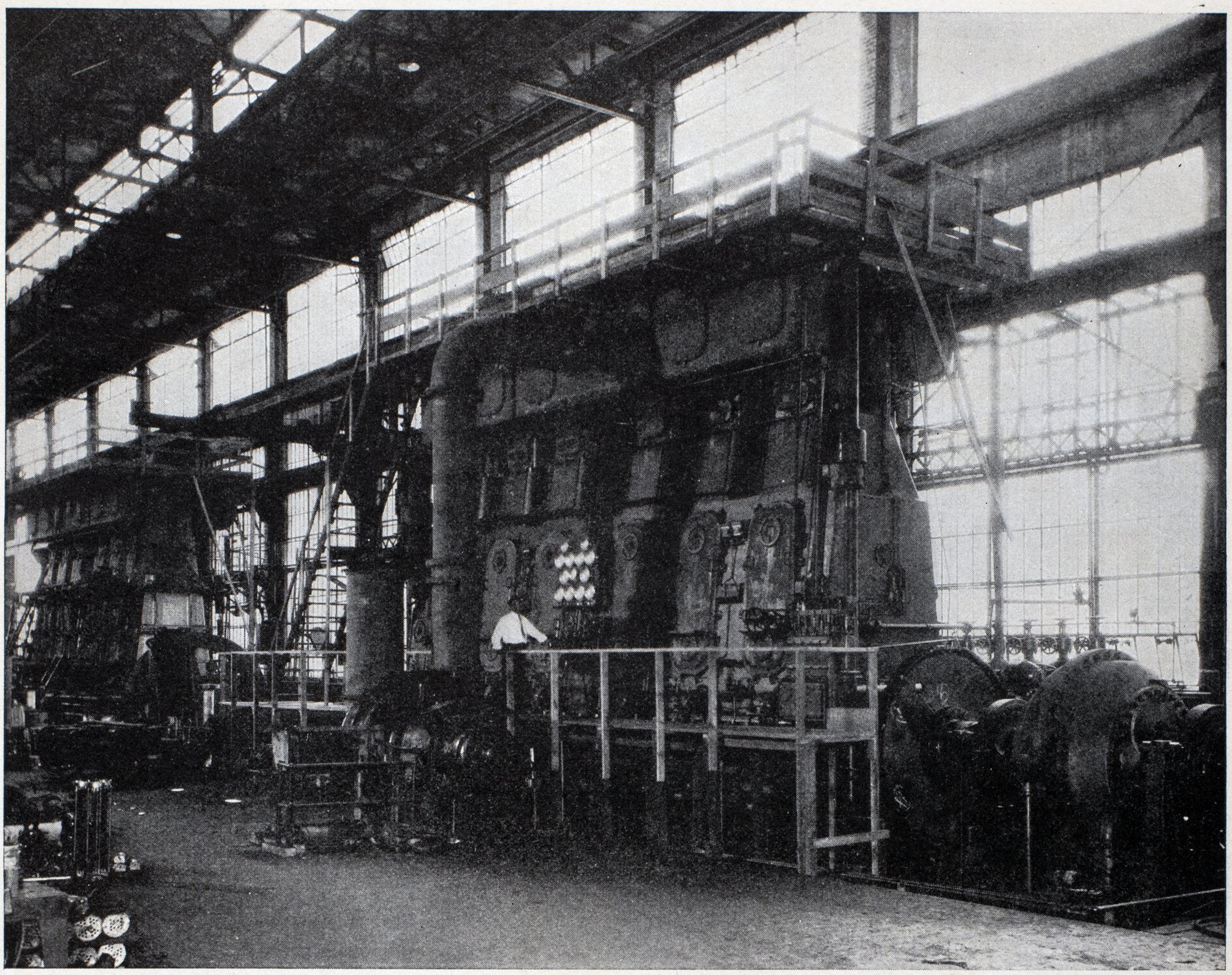

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LLOYD'S Reports (Sept. 30, 1928) World Marine Engines Under Construction:

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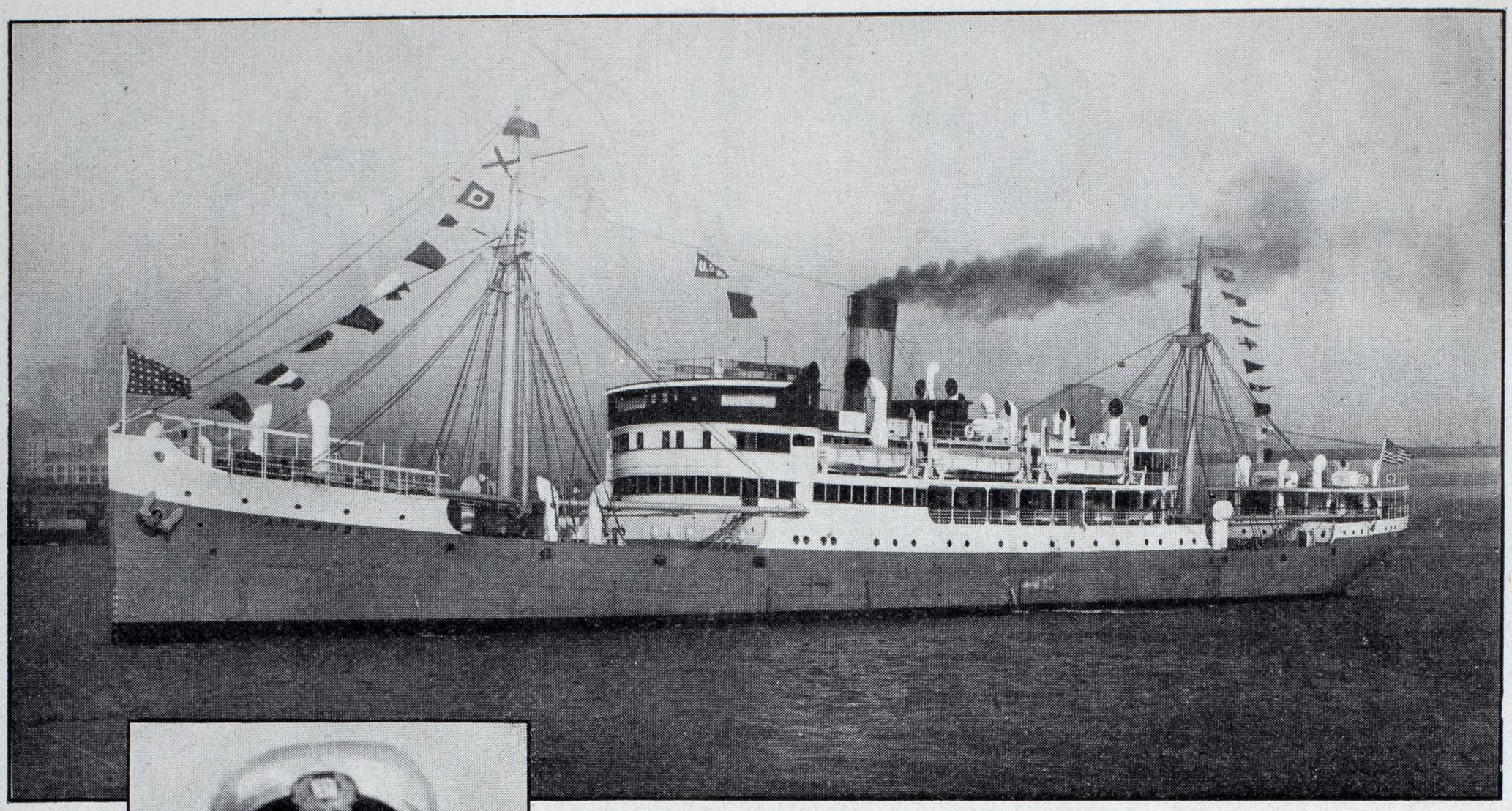

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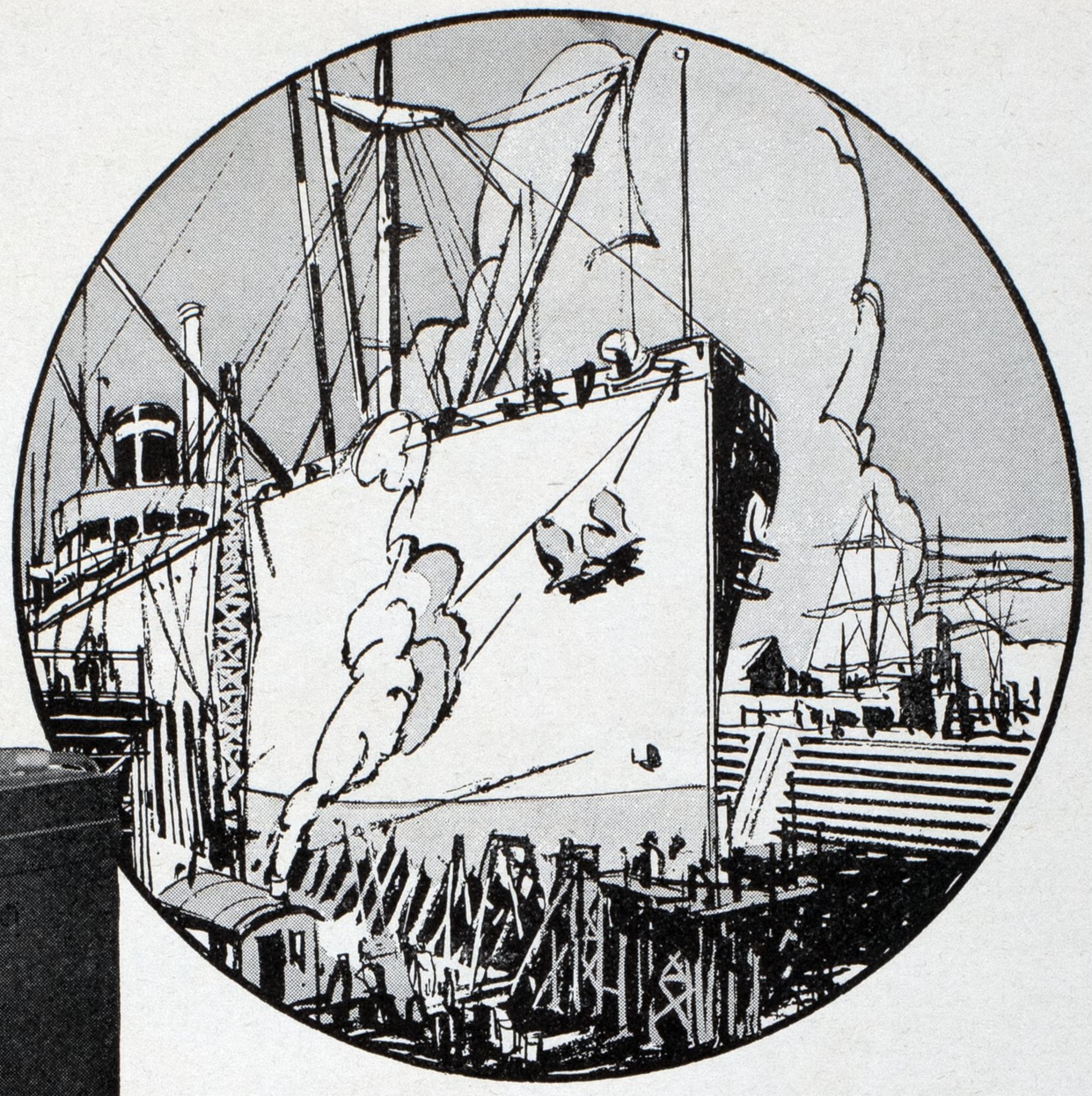

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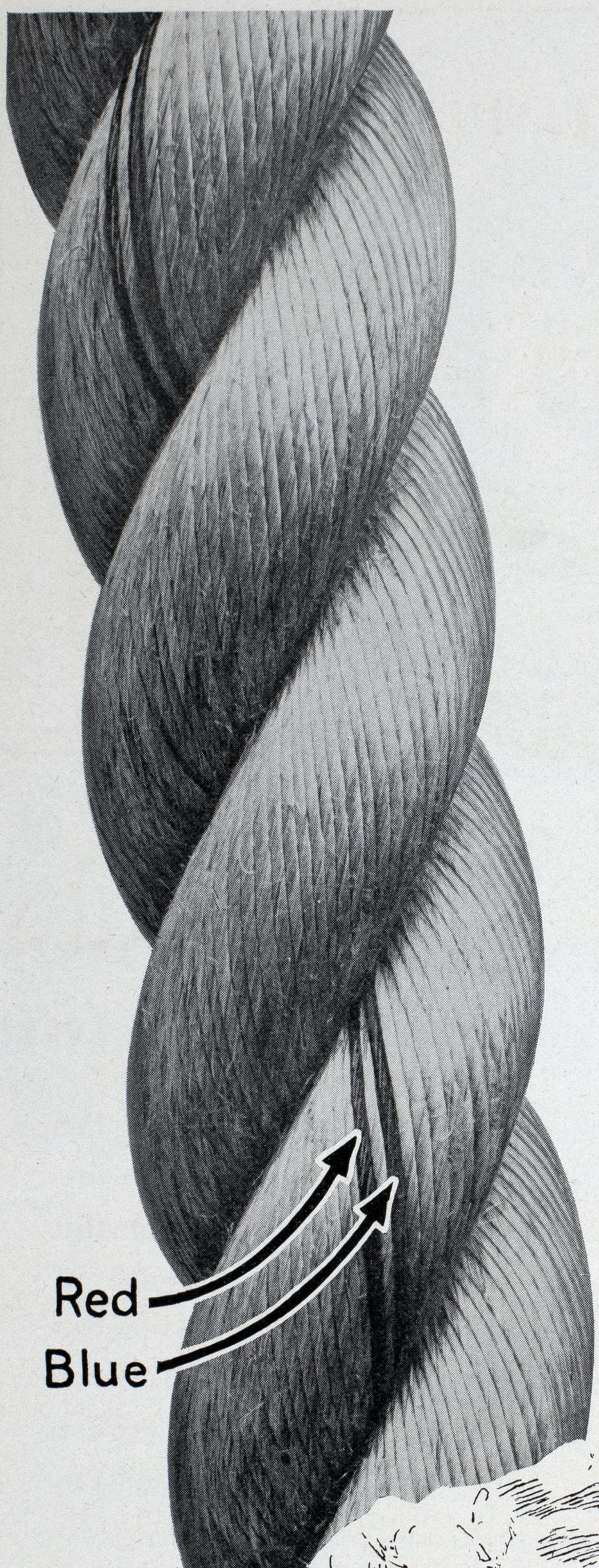

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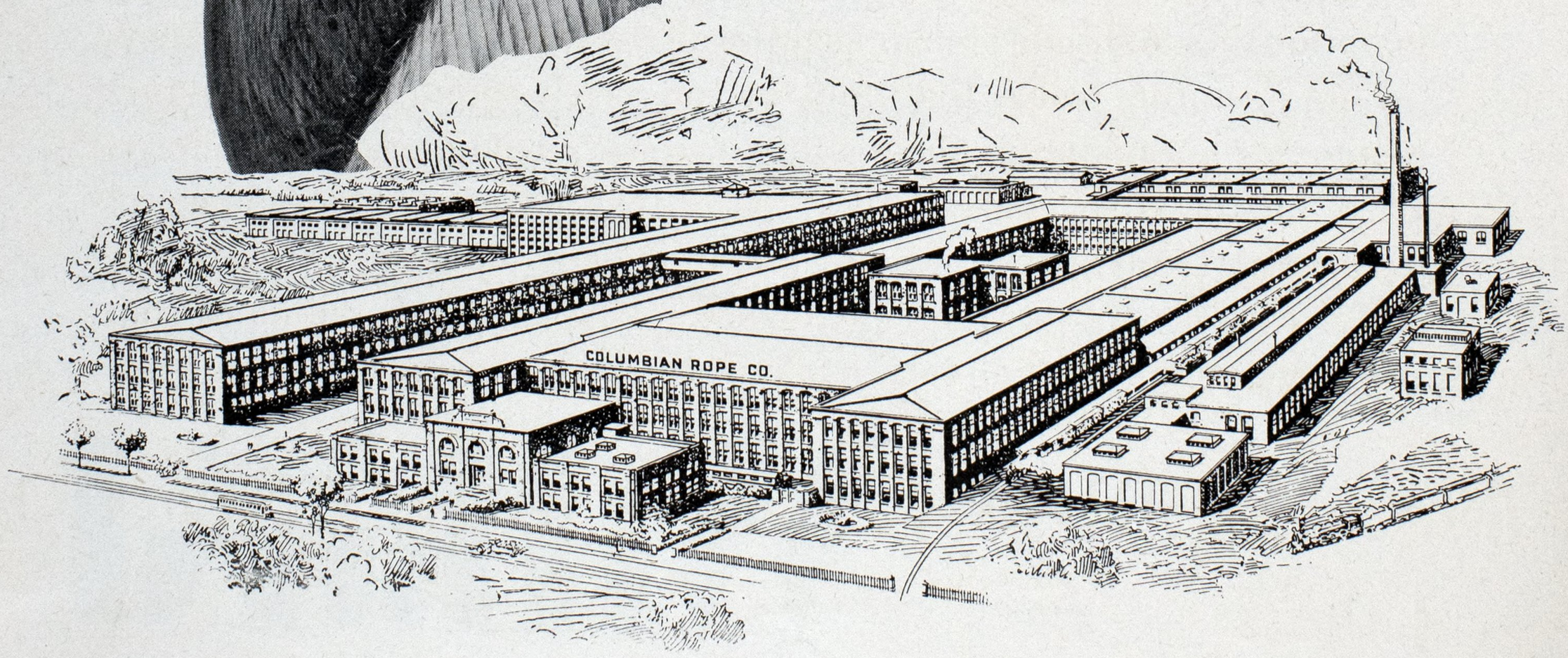

They Stand By for Emergency

LAKE ships need Uncle Sam's fog horns only when there is fog. They need his lighthouses only when it is dark—his life-saving service only when storms bring wrecks.

But the government must maintain these *all* the time—so that you can use them *part* of the time.

Likewise, Lake ships need big dry-docks, foundries, forges, boring mills and lathes—they need the repair services of skilled workmen, engineers, architects and draftsmen—only a few times a year. But someone must maintain these unlimited repair facilities all the year. And that costs money.

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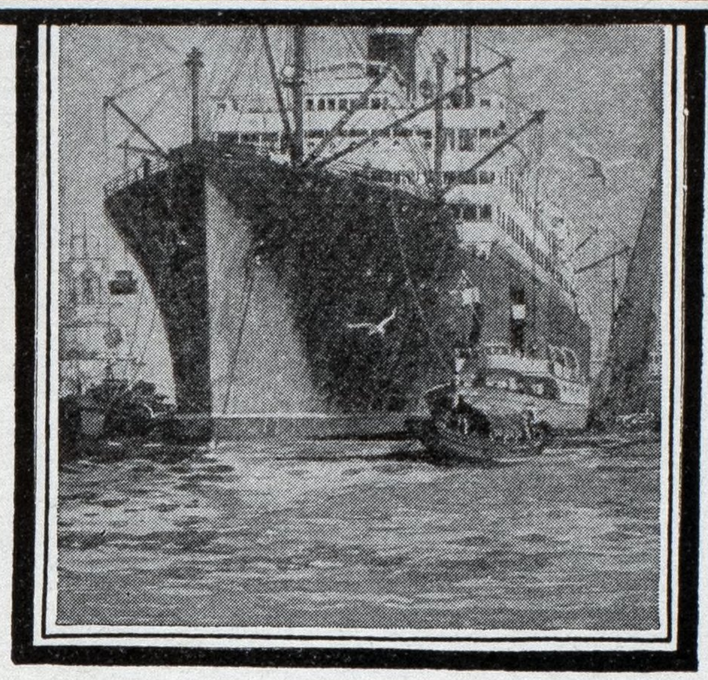

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DIXIE UK LINE
Dixie Steamship Co.
Whitney Central Bank Bldg.,
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New Orleans to United Kingdom

GULF BRAZIL RIVER PLATE LINE
Mississippi Shipping Co., Inc.
Hibernia Bank Bldg.
New Orleans, La.
Gulf ports to Brazil and River Plate ports east coast of South America

AMERICAN MERCHANT LINES
J. H. Winchester & Co., Inc.
17 Battery Place, New York City
Passenger and freight services to United Kingdom ports

***AMERICAN INDIA LINE**
Roosevelt S. S. Co., Inc.
11 Broadway, New York City
North Atlantic ports to Indian ports

***ATLANTIC AUSTRALIAN LINE**
Roosevelt S. S. Co., Inc.
11 Broadway, New York City
New York to Australian ports
Periodically the above two lines combine on an around-the-world Service via the Suez Canal

DIXIE MEDIT. LINE
Dixie Steamship Co.
Whitney Central Bank Bldg.
New Orleans, La.
New Orleans to Mediterranean ports

GULF WEST MEDITERRANEAN LINE
Tampa Interocean S. S. Co.
917 Whitney Building
New Orleans, La.
Gulf and South Atlantic ports to Portuguese, Spanish, and North African ports (west of Bizerta)

MISSISSIPPI VALLEY EUROPEAN LINE
Mississippi Shipping Co., Inc.
Hibernia Bank Bldg.
New Orleans, La.
New Orleans to French Atlantic and Belgian ports

MOBILE OCEANIC LINE
Waterman S. S. Corp.
Mobile, Ala.
Mobile and Eastern Gulf ports to United Kingdom and continental European ports

AMERICAN PIONEER LINE
Atlantic Division
Roosevelt S. S. Co., Inc.
11 Broadway, New York City
N. Atl. ports to Orient and Dutch E. I.

AMERICAN PIONEER LINE
Gulf Division
Tampa Interocean Co.
614 Whitney Bldg., New Orleans, La.
Gulf ports to Orient and Dutch E. I.

TEXAS MEDIT. LINE
Texas Oceanic S. S. Co., Inc.
Cotton Exchange Bldg.
Galveston, Tex.
Texas ports to Mediterranean ports

AMERICAN REPUBLICS LINE
C. H. Sprague & Son, Inc.
33 Broad Street, Boston, Mass.
N. and S. Atl. ports to Brazil and River Plate ports, east coast of S. America

ORIOLE LINES
Consolidated Navigation Co.
Citizens National Bank Building
Baltimore, Md.
North Atlantic ports to west coast of United Kingdom and Irish ports

SOUTHERN STATES LINE
Lykes Bros.-Ripley S. S. Co., Inc.
925 Whitney Central Building
New Orleans, La.
New Orleans and Texas ports to German and Holland ports

For complete information on either freight or passenger services as to rates, ships, dates of sailing, etc., write to

UNITED STATES SHIPPING BOARD

Merchant Fleet Corporation

WASHINGTON, D. C.

YANKEE LINE
Rogers & Webb
110 State Street, Boston, Mass.
North Atlantic ports to German ports

TEXAS UKAY LINE
Texas Oceanic S. S. Co., Inc.
Cotton Exchange Bldg.
Galveston, Texas
Texas ports to United Kingdom ports

TEXAS STAR LINE
Lykes Bros.-Ripley S. S. Co., Inc.
925 Whitney Central Bldg.
New Orleans, La.
Texas ports to French and Belgian ports

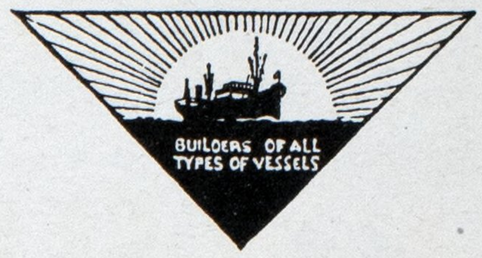
UNITED STATES LINES
45 Broadway, New York City
Passenger, mail, freight services to England, Ireland, France and Germany

***Accommodations available for a limited number of passengers on these lines.**

SUN SHIPBUILDING & DRY DOCK COMPANY

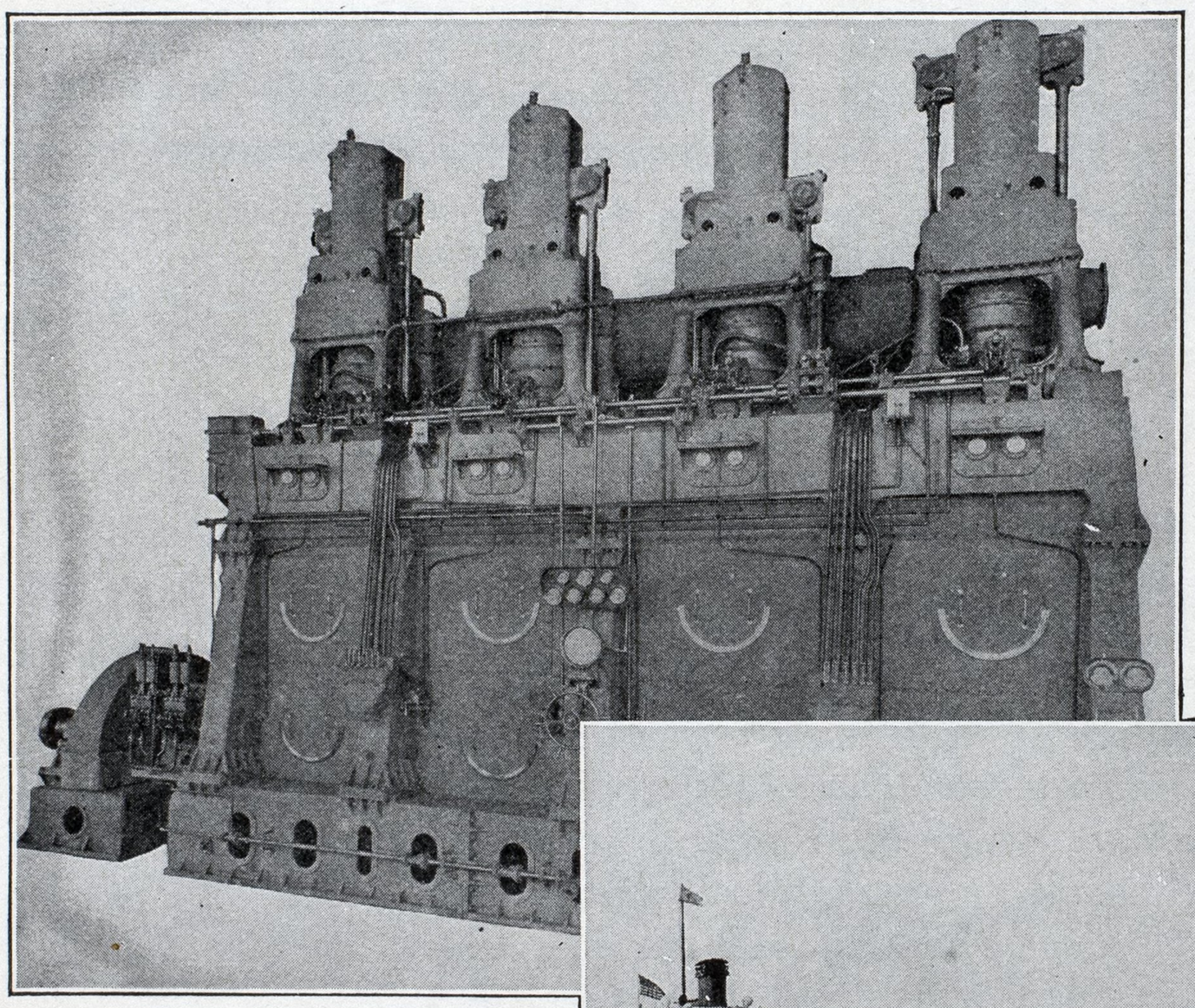
Builders of

SUN-DOXFORD DIESEL ENGINES

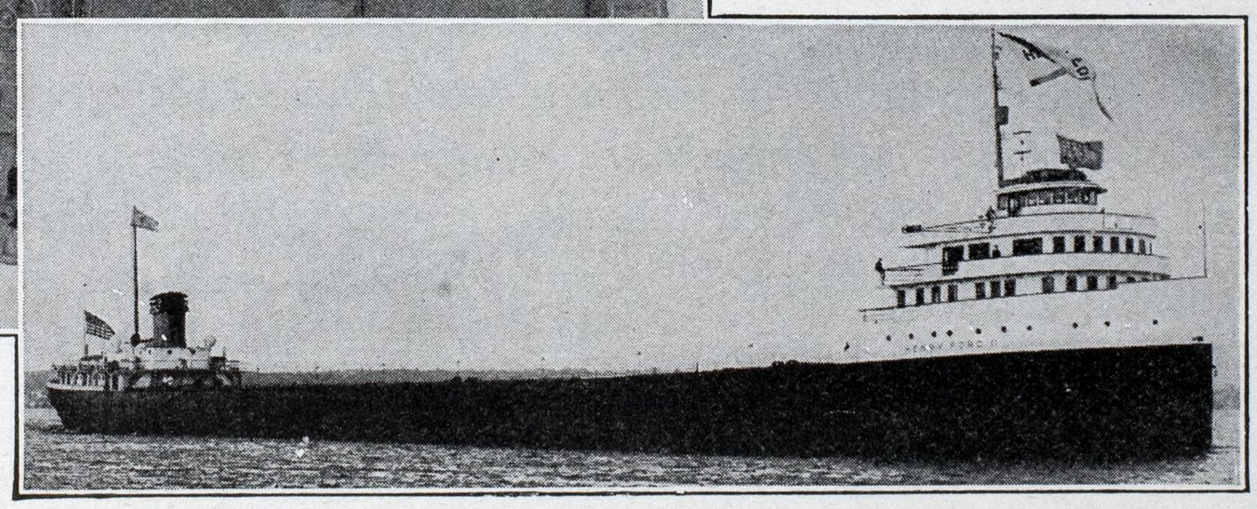


The Engines that Power

"HENRY FORD II" *and* "BENSON FORD"



3000 S. H. P. Sun-Doxford Diesel Engines power the two motorships, "Henry Ford II" and "Benson Ford".



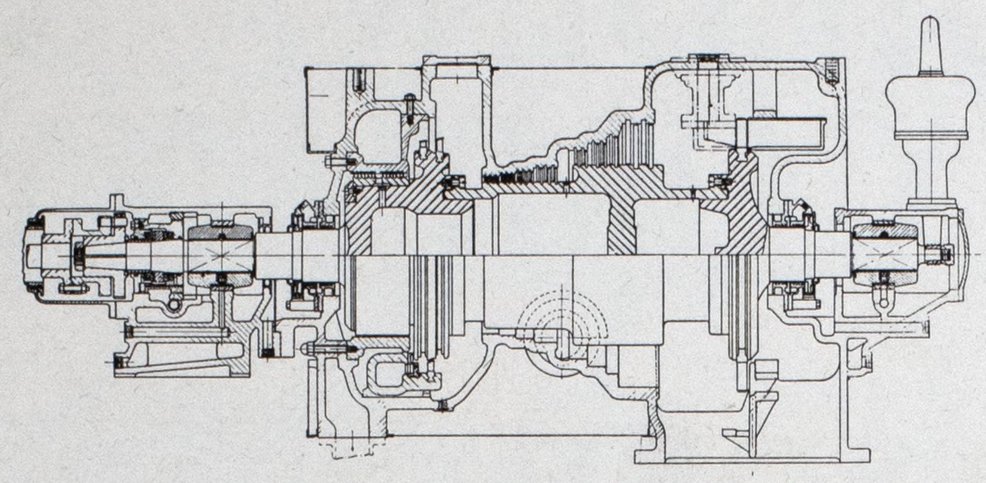
M. S. "Henry Ford II"

SUN-DOXFORD *and* JUNKERS PATENTS

Main Office and Works:
Chester, Pa. - U. S. A.

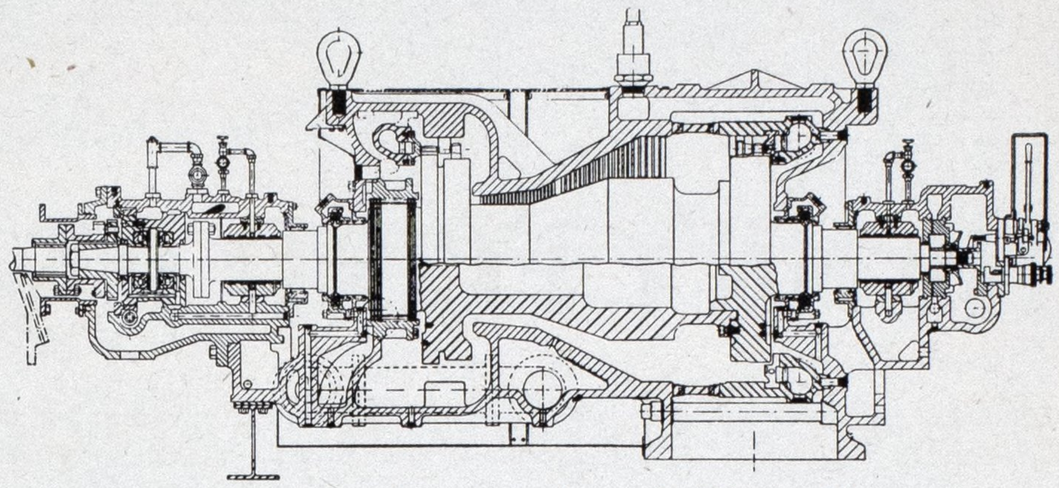
Philadelphia Office:
Finance Building

New York Office:
Cunard Building



Longitudinal section through 1918 turbine.

~11 YEARS AGO



Longitudinal section through 1929 turbine.

~AND TODAY~~

WITHOUT discarding any time tried features of Westinghouse turbines, our marine engineers, during the past eleven years, have greatly increased the reliability and efficiency of geared turbine propelling machinery.

Outstanding features of the "1929" Westinghouse geared turbine include—stronger blading that gives greater resistance to steam erosion and insures a better overall turbine efficiency; "conically" machined spindle and cylinder which permit a smoother and more regular steam path through the turbine; a strong, sensitive and reliable oil-operated governor, that uses no knife edges or fly balls.

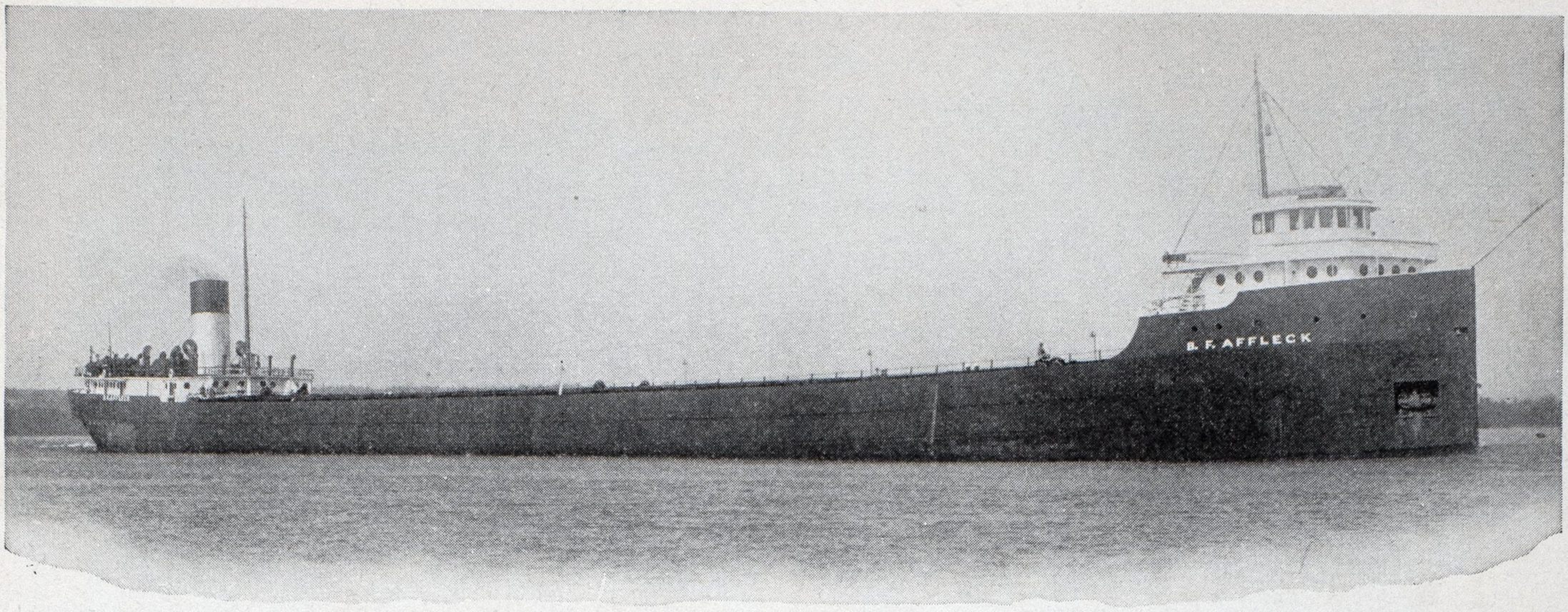
Consult our nearest office for further information about Westinghouse geared turbines.

Westinghouse Electric & Manufacturing Company
South Philadelphia Works Philadelphia, Pa.

Sales Offices in All Principal American Cities
Service Stations in All Principal American Ports

T 30293

Westinghouse



B. F. AFFLECK

Finest Type of Great Lakes Cargo Carrier

S.S. B. F. Affleck owned and operated by the Pittsburgh Steamship Company, is a single deck bulk cargo vessel of the standard type built for the iron ore, coal and stone trade of the Great Lakes. Her molded dimensions are: Length overall, 604 feet, length between perpendiculars, 580 feet; width 60 feet and depth 32 feet. Capacity 12,000 tons.

A diversified experience, covering the construction of all types of ships, fully qualifies us to meet *your* requirements thoroughly and with despatch.

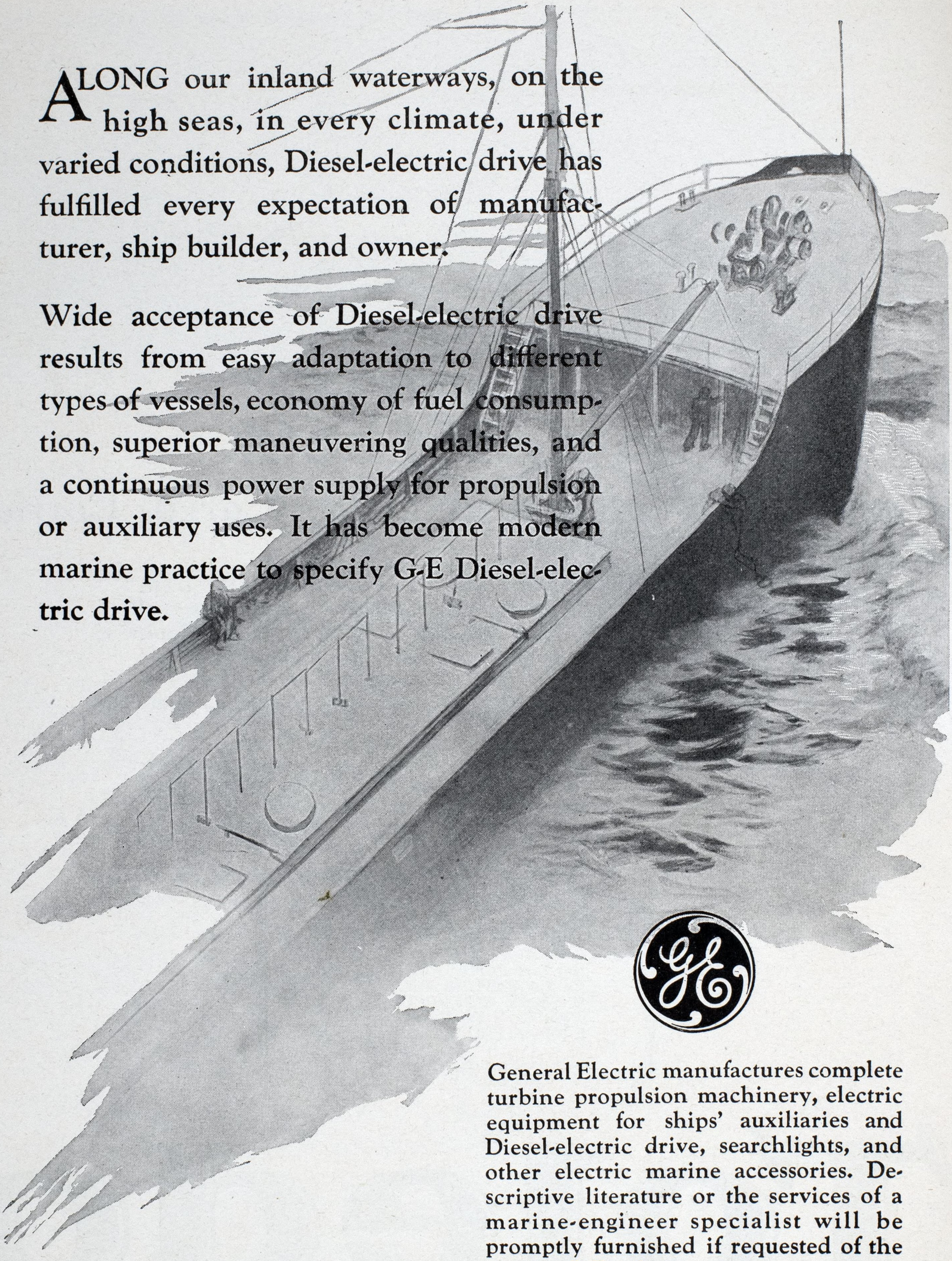
Some Other Ships We Have Built

Auto Ferry, LA SALLE
Auto Ferry, ESSEX
Car Ferry, WABASH
Car Ferry, CHIEF WAWATAM
Car Ferry, ST. MARIE
Car Ferry, ANN ARBOR No. 5
Twin Screw Excursion Steamer, THOUSAND ISLANDER
Self Unloading, JOHN W. BOARDMAN

Toledo
Shipbuilding Company, Inc.
Toledo, Ohio

ALONG our inland waterways, on the high seas, in every climate, under varied conditions, Diesel-electric drive has fulfilled every expectation of manufacturer, ship builder, and owner.

Wide acceptance of Diesel-electric drive results from easy adaptation to different types of vessels, economy of fuel consumption, superior maneuvering qualities, and a continuous power supply for propulsion or auxiliary uses. It has become modern marine practice to specify G-E Diesel-electric drive.

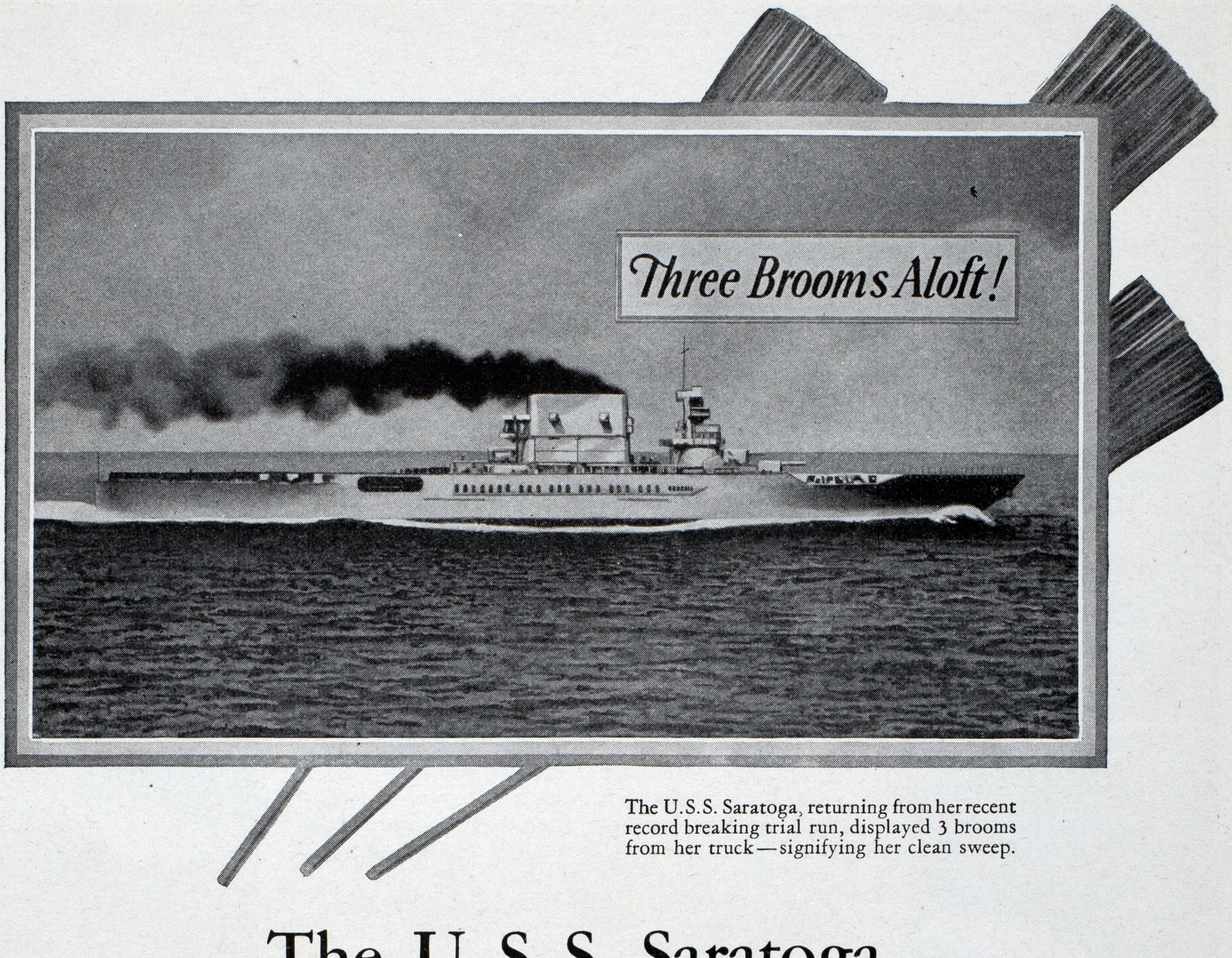


General Electric manufactures complete turbine propulsion machinery, electric equipment for ships' auxiliaries and Diesel-electric drive, searchlights, and other electric marine accessories. Descriptive literature or the services of a marine-engineer specialist will be promptly furnished if requested of the nearest G-E office.

123-18

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN PRINCIPAL CITIES



The U.S.S. Saratoga, returning from her recent record breaking trial run, displayed 3 brooms from her truck—signifying her clean sweep.

The U. S. S. Saratoga by Test the Fastest Capital Ship Afloat

THE NEW YORK SHIPBUILDING COMPANY is justly proud of having been instrumental in bringing this super vessel into the realm of mighty fighting ships. No nation on earth can today match this type of craft in size, speed and efficiency. Over all length 895 feet, extreme breadth 106 feet, depth from bottom of keel to upper deck 74 feet, total displacement 33,000 tons.

Built by an organization of specialists cooperating in the intricate tasks of modern ship construction, this vessel liberally exceeded her exacting contract requirements, in official Government trials.

	Guarantee		*Performance*
Shaft Horse Power	180,000	(Max.)	212,700
Speed in Knots	33	(Max.)	34.99
		(Avg.)	34.64

The same dominant quality of workmanship, the magnitude and diversification of the plant and the pride and tradition of New York Ship's personnel, continue available for all classes of merchant and naval ship design and construction.

New York Shipbuilding Co.

CAMDEN **NEW JERSEY**

Grace Line Awards Contract for Liner

Construction is going forward at our Camden Plant on a new Grace Liner to be delivered in about a year.

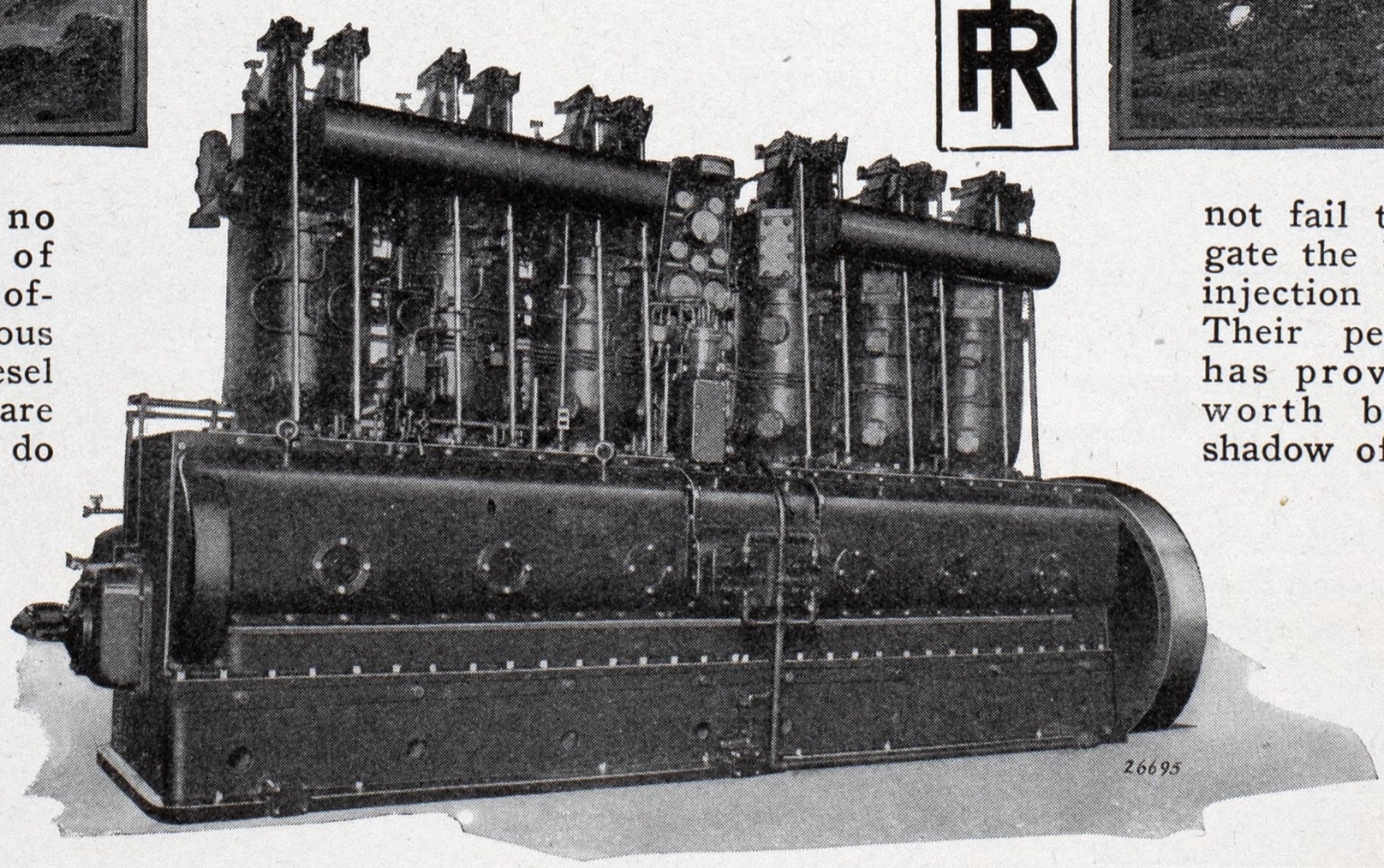
General dimensions:—About 505 ft. long, 64 ft. beam, 25 ft. draft, 18 knots speed, 160 passengers—turbo-electric drive.

IN the "forties," America startled the marine world by launching a new line of sailing vessels, known as clipper ships. Built on entirely new lines, so trim and fast were these vessels that they outdistanced even the steamships of their day. Setting unprecedented records for speed, they captured commerce wherever they went.

America is again in the race for shipping supremacy, and two things can make the race a success: the liberal terms of the Jones-White bill, and the economy offered by Diesel engine drive.

INGERSOLL-RAND COMPANY
11 Broadway, New York City
Offices in principal cities the world over

Ingersoll-Rand



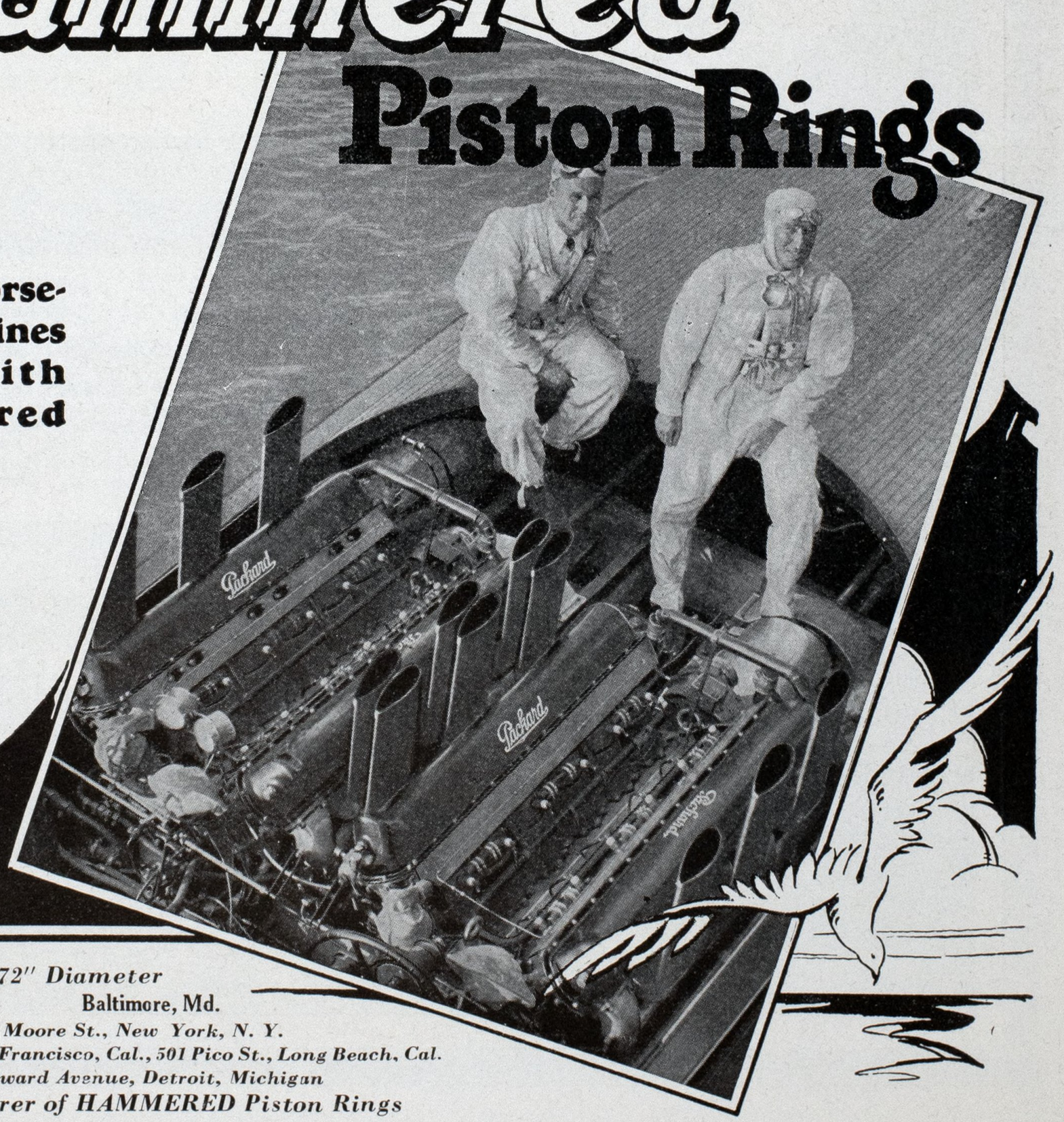
THERE is no other form of prime mover that offers the marvelous savings of the Diesel engine. If you are building today, do not fail to investigate the I-R solid-injection Diesels. Their performance has proved their worth beyond a shadow of doubt.

71-MOE

WORLD'S RECORD
ON THE WATER —
92.8 miles an hour —

A Gar Wood boat driven by Packard Engines, equipped with

American Hammered Piston Rings



The two 1,100 horse-power Packard Engines were equipped with American Hammered Piston Rings.

Available in All Sizes Up to 72" Diameter

The American Hammered Piston Ring Co. Baltimore, Md.

New York Marine Branch, 11 Moore St., New York, N. Y.

Pac. Cst. Marine Branch, 215 Mrkt. St., San Francisco, Cal., 501 Pico St., Long Beach, Cal.

Detroit Office, 7338 Woodward Avenue, Detroit, Michigan

World's Largest Manufacturer of HAMMERED Piston Rings

Plants Ready for Emergency Repairs Day and Night

RIVER ROUGE PLANT
Foot of Great Lakes Avenue
Telephone Cedar 0011

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FRANK M. SCOTTEN, Mechanical Engineer
227 Military Rd., Dearborn, Mich.....Dearborn 447
GEORGE CAIN, General Yard Supt.
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E. D. MACKENZIE, Yard Supt.
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Shipbuilders and Engineers

General Offices

River Rouge, Michigan

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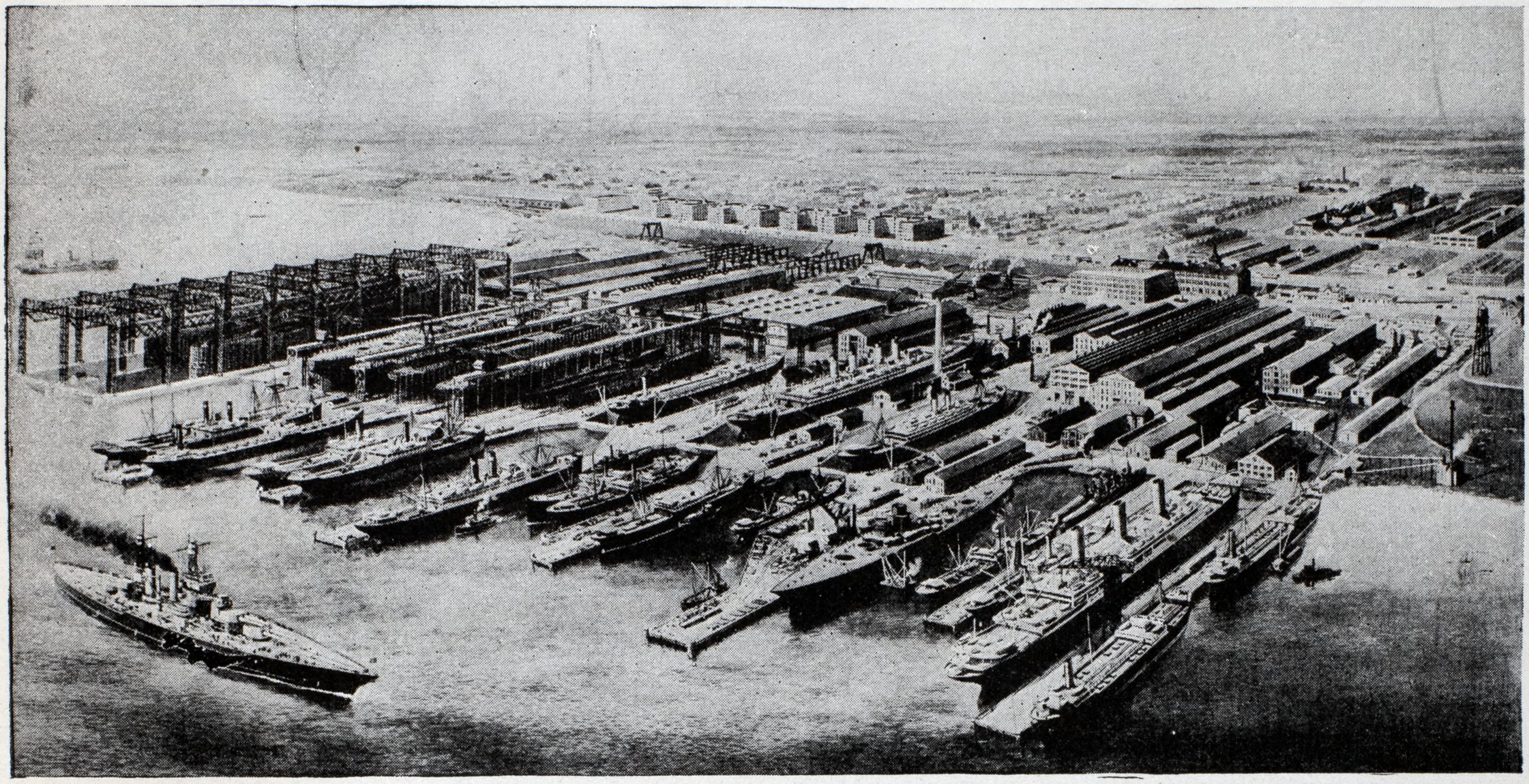
Engine Works Equipped For General Heavy Machine and Foundry Work
Detroit, Michigan

Complete Shipbuilding Dry Dock and Repair Facilities
River Rouge, Mich., and Ashtabula, Ohio

Shipbuilding and Repairing facilities unsurpassed in America



Here ships are completely overhauled and refitted at the same time

RESOURCES, capacity, experience and facilities are found here in a combination which develops the highest efficiency in the building, converting and repairing of ships.

In the final analysis, it is the proven economy, consistently demonstrated in all classes of work which has placed this organization at the head of preferred shipyards.

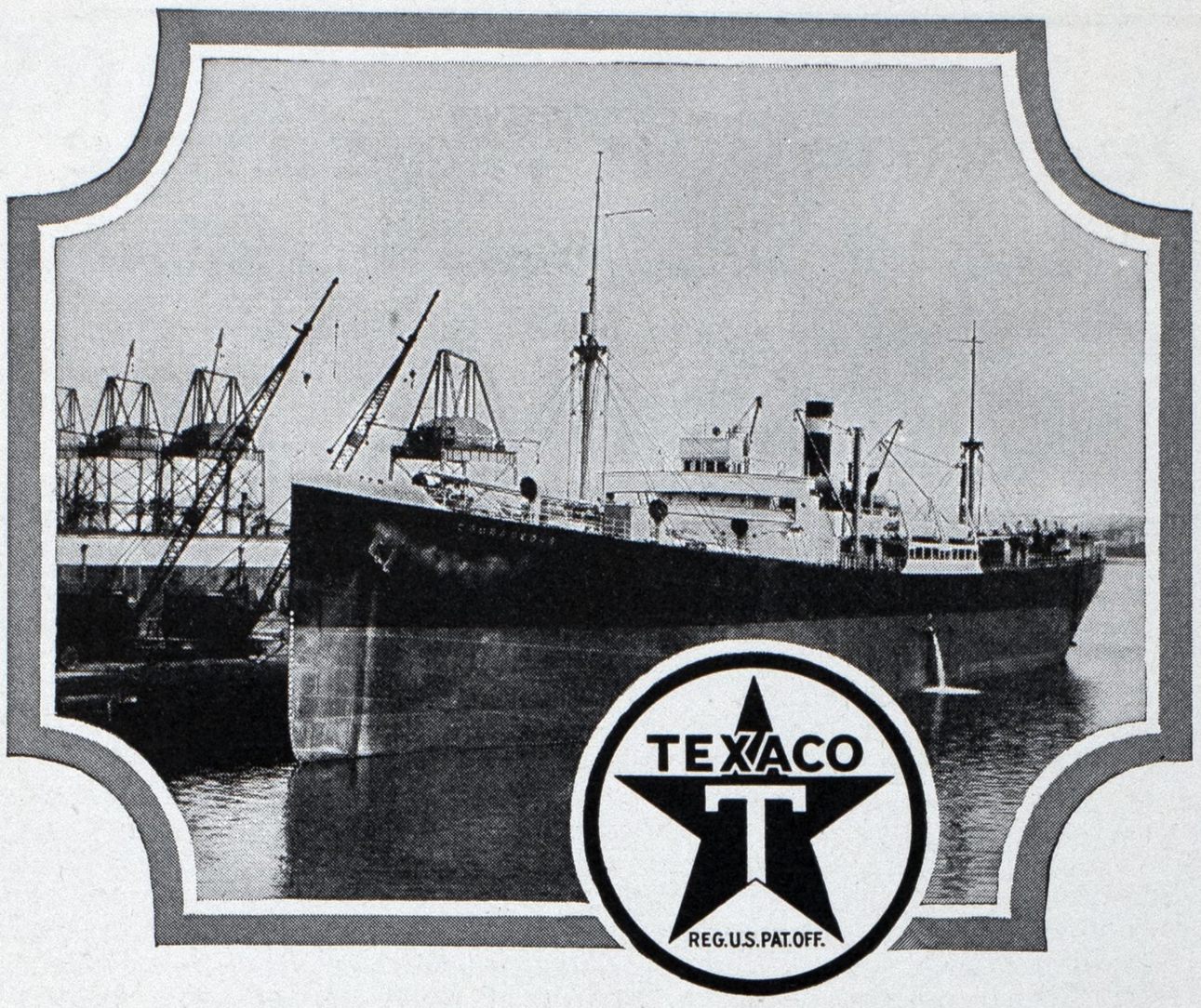
Every detail of construction, inspection and test are performed with an accuracy and thoroughness that insure maximum ship safety and operating economy.

Marine Paints of Every Description Including Newport News Composition Anti-Corrosive and Anti-Fouling.

FOUNDRIES
FORGES
JOINER SHOP
3
LARGE
GRAVING
DOCKS

Newport News Shipbuilding and Drydock Co.

Newport News, Virginia ***223 Broadway, New York City***



U. S. Shipping Board converted Motor Ship "Courageous". Equipped with four 8-cylinder McIntosh and Seymour 4 cycle, single acting Diesel Engines, of 1200 H.P. each. These engines are directly connected with 4 generators which will supply current to a 4,000 H.P. General-Electric Drive Motor.

TEXACO URSA OIL

will lubricate the Diesel Engines and the Electric Drive Equipment

OF THE

M. S. COURAGEOUS

The M. S. Courageous is the first Diesel-Electric Drive Vessel to be built for the U. S. Shipping Board—and the World's largest.

This vessel, since its conversion by the Federal Shipbuilding Co., can maintain a speed of over 13 knots—or 3 knots faster than called for under her original design.

In developing and maintaining this greater speed, TEXACO URSA OIL will give a good account of itself.

In fact, TEXACO URSA OIL will give a good account of itself on *any* type or make of Diesel Engine.

Whatever your marine lubrication requirements, call on The Texas Company *First!*

We'll supply the lubricant that will put you first:—

1—In performance
2—In protection
3—In economy of operation

Stocks Kept at Ports Throughout the World

THE TEXAS COMPANY

Texaco Petroleum Products

Marine Sales Division

Dept. KD, 17 Battery Place, New York City

OFFICES IN PRINCIPAL CITIES

Slashing 36 1-2 cents an Hour From Trucking Costs

On the New Orleans Docks the Southern Pacific Lines Cuts Expenses $1,043.90 per truck year.

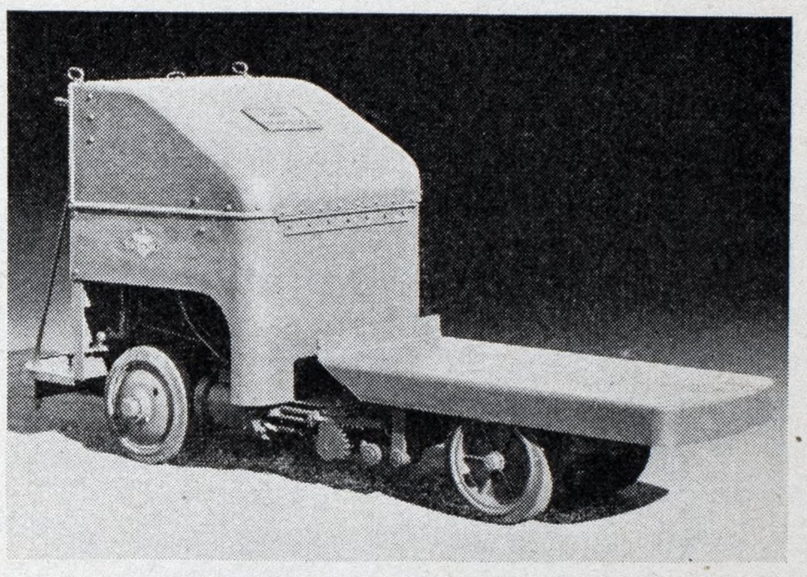
Since the old days of shuffling stevedores on the levees of New Orleans, southern carriers and shippers have become keenly *cost conscious*. As a result, eight Clark Truclifts are now doing for this big transportation company, work which would require 28 hand truckers. However the hand trucks gave way to another mechanical method several years ago. Now Clark Truclifts have further reduced costs over the "improved method", and are showing a further net gain of more than two thousand dollars a year.

The Truclifts go directly aboard the boats, picking up or depositing skids at the hatches or in the between-deck cargo spaces.

This case has been carefully surveyed by an unbiased engineering concern. Send the coupon for a copy of their report.

Gasoline Propelled and, therefore, competent for 24 Hours' Continuous Service

—and just as potent in the last hour as in the first.



This Clark 3-Ton Truclift is a self-contained power unit; it lifts 6000 lbs. in 8 seconds, and carries its maximum load at 7 miles per hour. Simply operated by one man. Clark Tructractors are built in other models as follows:

"Clarktor" 4-Wheel Tractor.
Clark Tructractor (4 Models.)
"Clarkat" 3-Wheel Tractor.
Clarktor Sand Digger.
Clark Tructier.

CLARK TRUCTRACTOR COMPANY
BATTLE CREEK, MICH.

CLARK TRUCLIFTS

Send this Coupon for Actual Cost Data

Clark Tructractor Co.

Please send certified engineering survey giving in detail the savings made by Clark Truclifts, handling freight on docks and steamers.

Name .....

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Company .....

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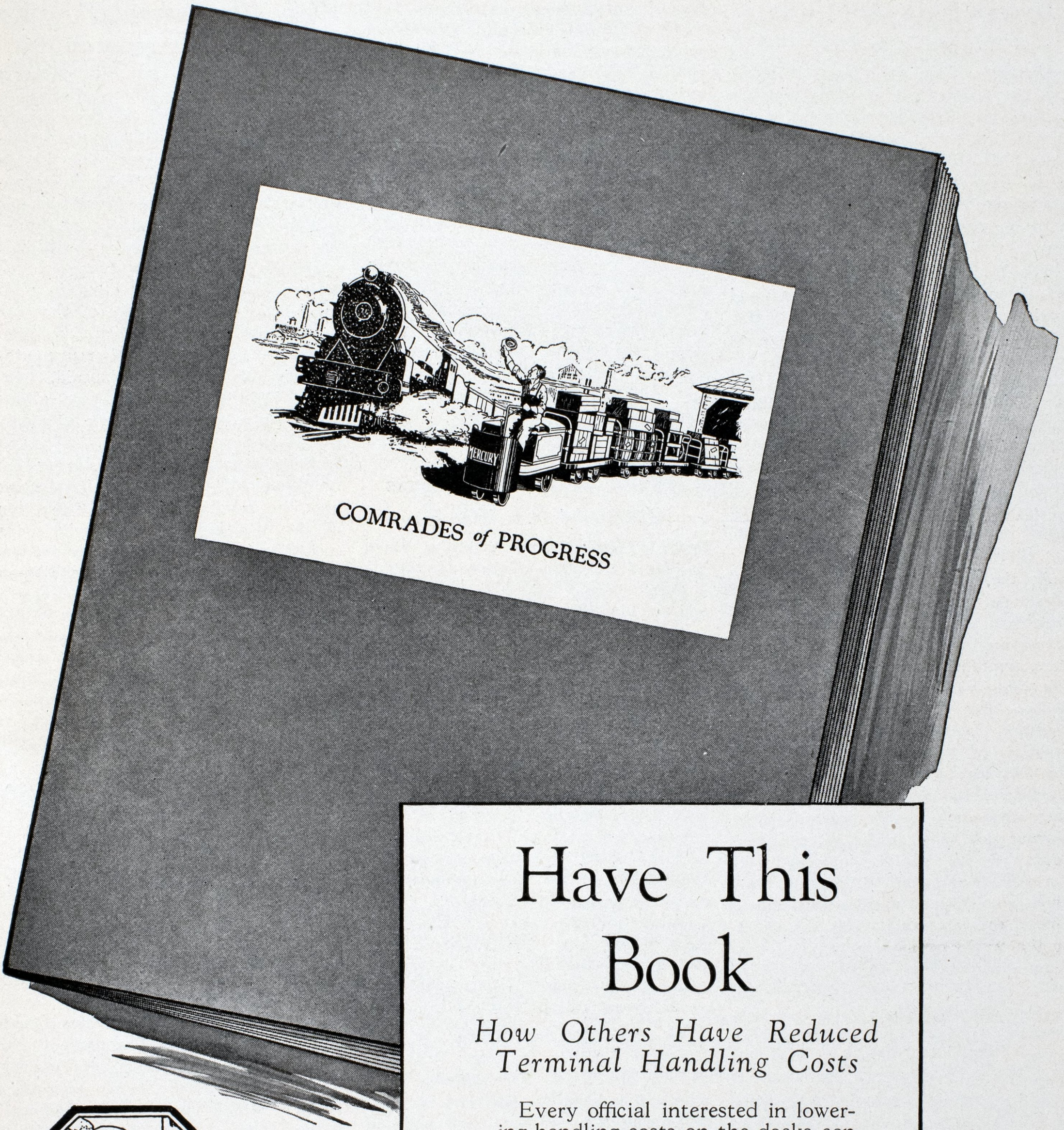


Have This Book

How Others Have Reduced Terminal Handling Costs

Every official interested in lowering handling costs on the docks can profit from this book. It records the results of cost reduction effort in 40 terminals. Terminal superintendents themselves wrote it. All conditions of operations are included and the remedies shown. Comparative costs are given.

Copies of this book will be gladly sent on request. Have your secretary write for yours today, that tomorrow you may have the data on the Bush Terminal Company before you.

Mercury Manufacturing Company
4160 South Halsted St.
Chicago, Illinois

Mercury
Trackless Train

Why BATTERY VOLTAGE *counts in material handling*

It's the secret of sustained speed that enables your industrial electrics to do a bigger day's work

YOU will get more material handled by your electric industrial trucks and tractors if the batteries that drive them maintain a consistently high voltage right through the day.

High voltage means good speed. That's why it is one of the first considerations in buying storage batteries.

That's also why you will find so many industrial electrics equipped with Exide-Ironclad Batteries.

More and more users of these vehicles are finding that an Exide-Ironclad-driven truck keeps on the jump right up to quitting-time.

That truck will handle any kind of tough job, too. The Exide-Ironclad has such flexible power ability that it can vary its output rate to meet any demand—a steady flow for level hauling, or a surge of power to climb a ramp.

Unusually low charging cost is another Exide-Ironclad advantage. At the panel, this battery takes in current quickly and with little waste.

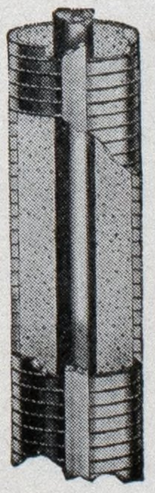
And this battery stays on the job for years. You can always count on it for a long, active life.

Other men have confirmed these statements by actual test or by asking Exide-Ironclad users. Do this yourself. It will be worth your while to get the full details about this efficient, economical battery for industrial trucks and tractors.

The Exide-Ironclad positive plate consists of a metal grid, from which extend metal conducting rods, each surrounded by active material and cased in a slotted rubber tube.

Exide
IRONCLAD
BATTERIES

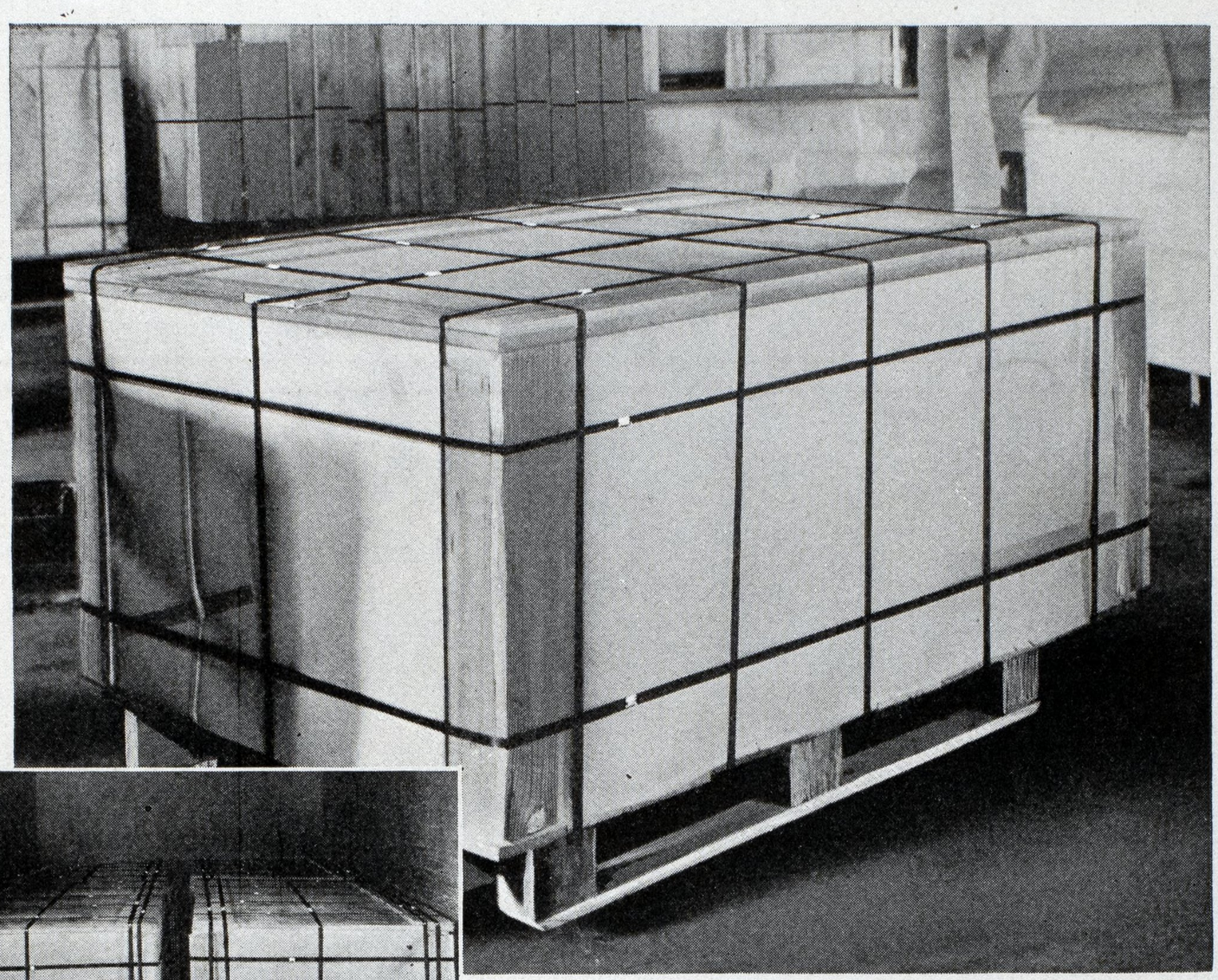
Cross-section showing how the rubber tube retains in place and retards the loss of the active material. The slits give the electrolyte free access to the active material.

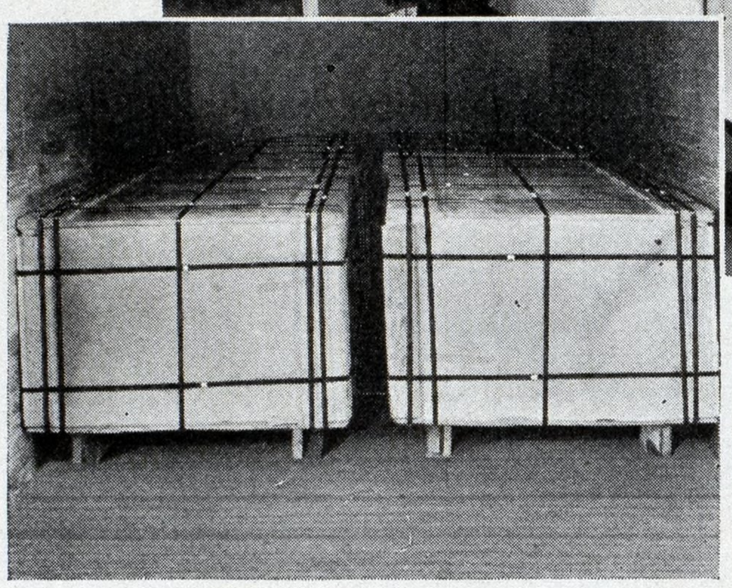


THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia

Exide Batteries of Canada, Limited, Toronto

SAFE—EASY—QUICK





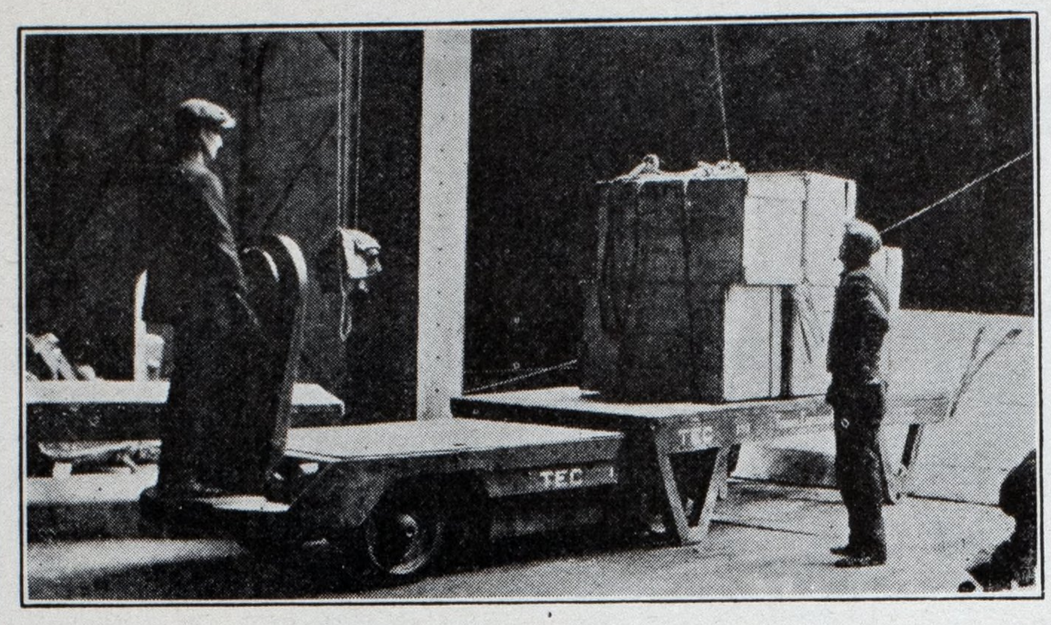
***"Bound to get there"* with**
ACME NAILLESS STRAP

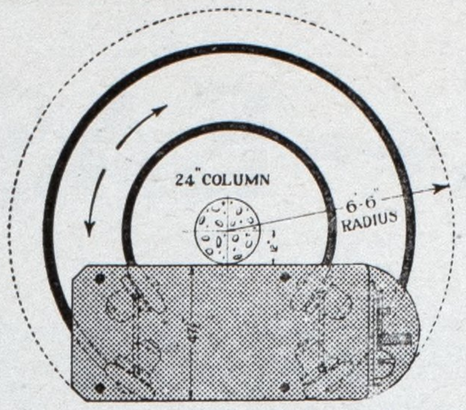
The fast, sure, method of securing loads to skids with steel bands (and again strapping entire groups of these skids into compact units) as pioneered and perfected by Acme Steel Company, has so simplified what was formerly a slow and costly job that carriers and freight handlers are lending their aid to promote universal adoption of this practice.

The expert knowledge of Acme Engineers, gained through years of experience in the development of modern shipping methods, is at the disposal of any shipper or carrier interested in skid shipping. We invite your inquiries.

ACME STEEL COMPANY

General Offices: 2840 Archer Avenue, Chicago, Ill.





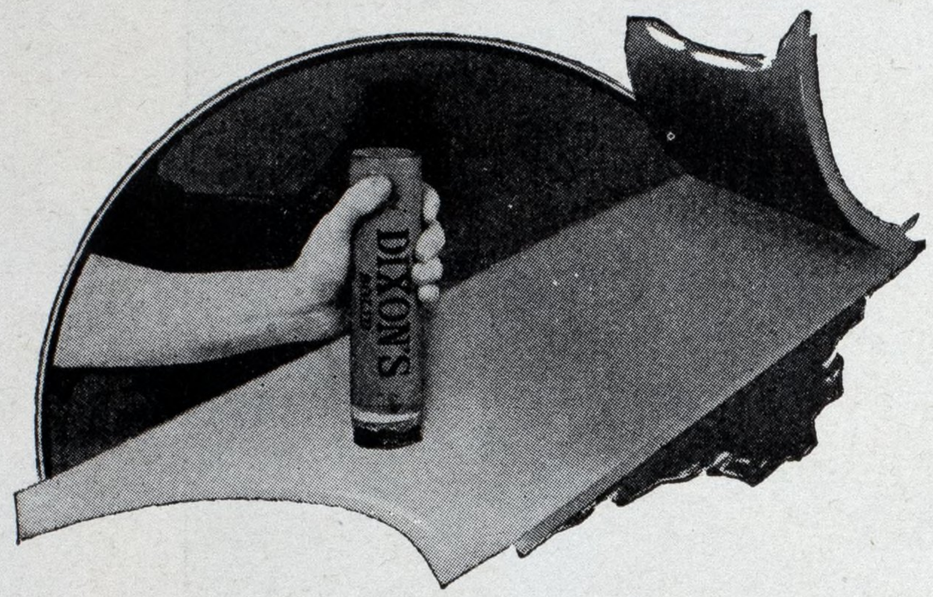
Area combined with short turning radius

The only complete system of mechanical freight handling for marine terminals. One truck with instantaneous attachments for handling any type of cargo.

TEC

Terminal Engineering Co.

17 Battery Place, New York, N. Y.



Dixon's
Belt Dressing

LEATHER, rubber and fabric belts all grip better when treated with Dixon's Belt Dressing—and, this aid to longer belt life and better operation "goes on" without the slightest danger of "clogging" or harming the finest belt.

Its handy stick form permits belt dressing without the stopping of machinery. To use it, simply tear off part of the paper around the stick, grip firmly in the hand and hold it on to the moving belt. No loss of time—no dirt—no slipping belts—and, in addition Dixon's "food for belts" will keep your belts in perfect condition.

If your belts are exposed to steam, spattering water, chemicals, or heavy dust condition, order—

Dixon's Traction Belt Dressing

a special paste dressing made especially for this type of service.

Circular 81-O will give you full information on each of these products.

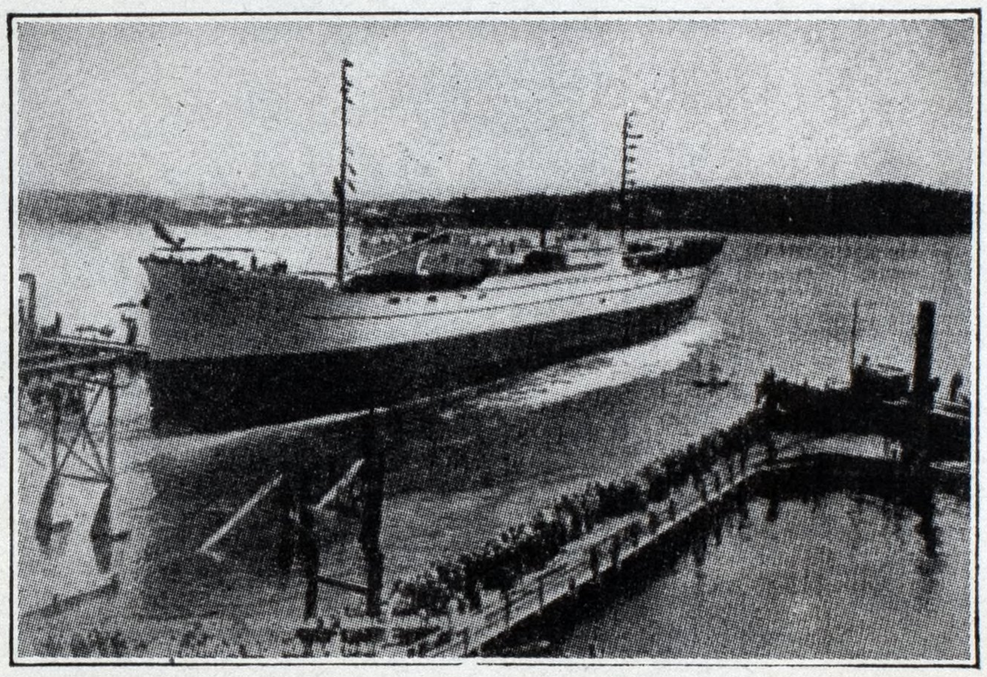
Joseph Dixon Crucible Company

Jersey City D X N TRADE MARK **New Jersey**

Established 1827

BATH IRON WORKS

Launching 425 ft. steel Steamship



Years of experience in design and building water craft, have won for Bath Iron Works an enviable reputation. Sound materials straight thru, expert designing, conscientious workmanship—these are features of every vessel that leaves the docks of the Bath Iron Works.

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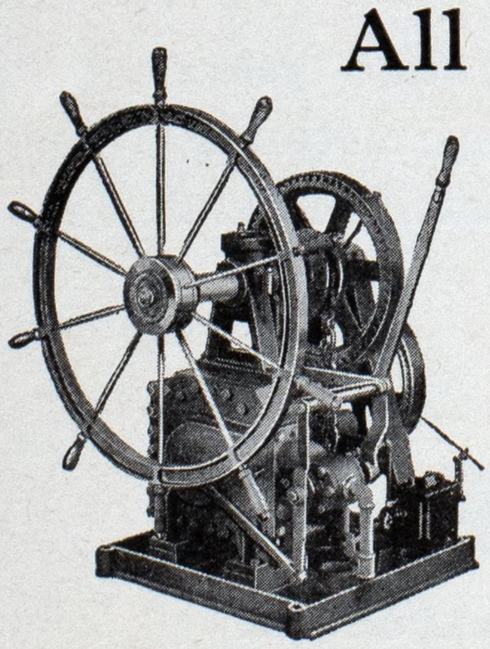

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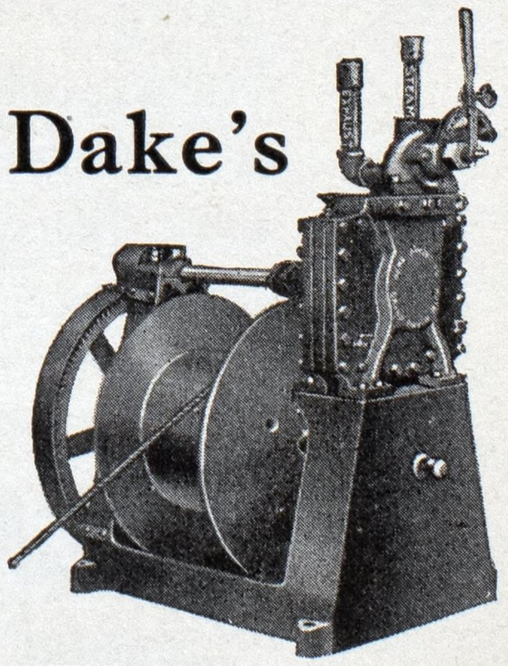

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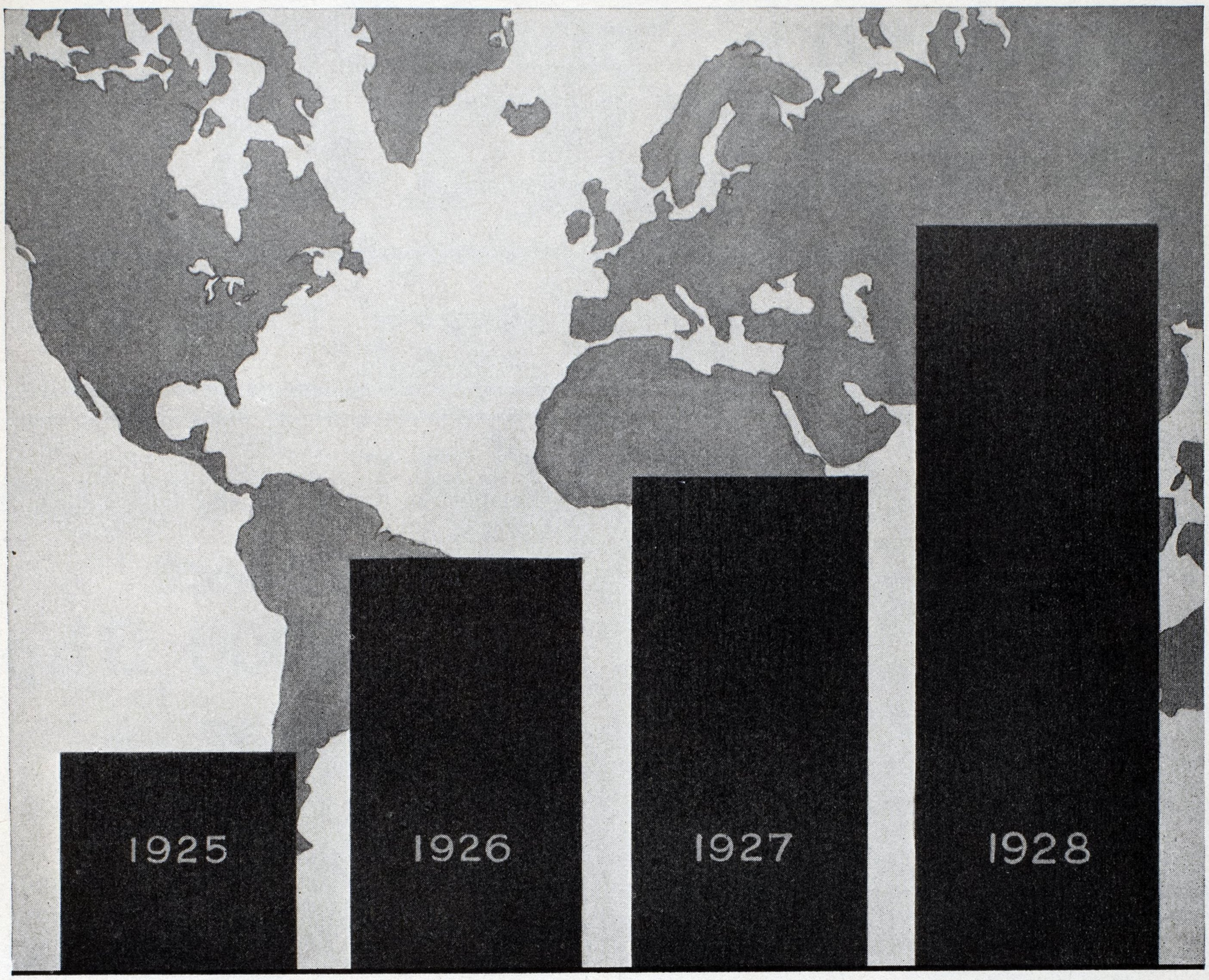

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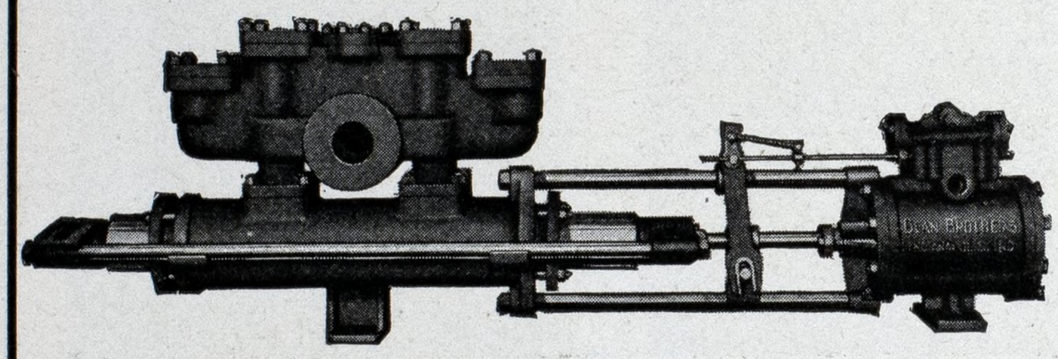

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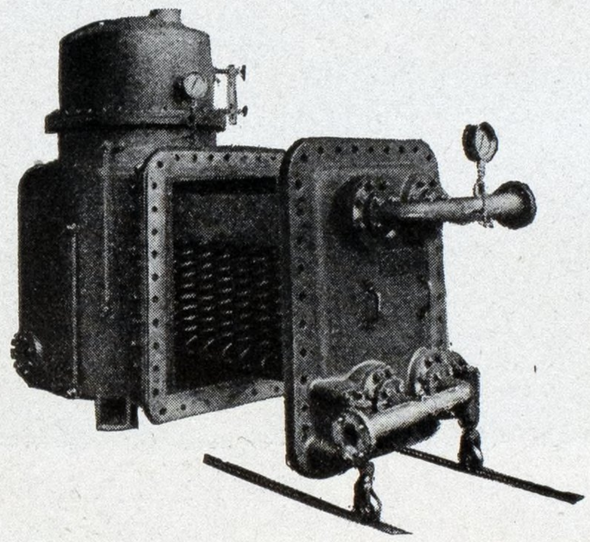

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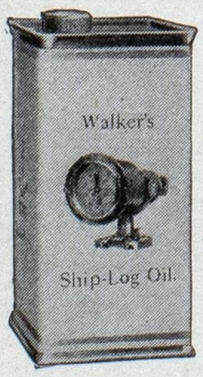

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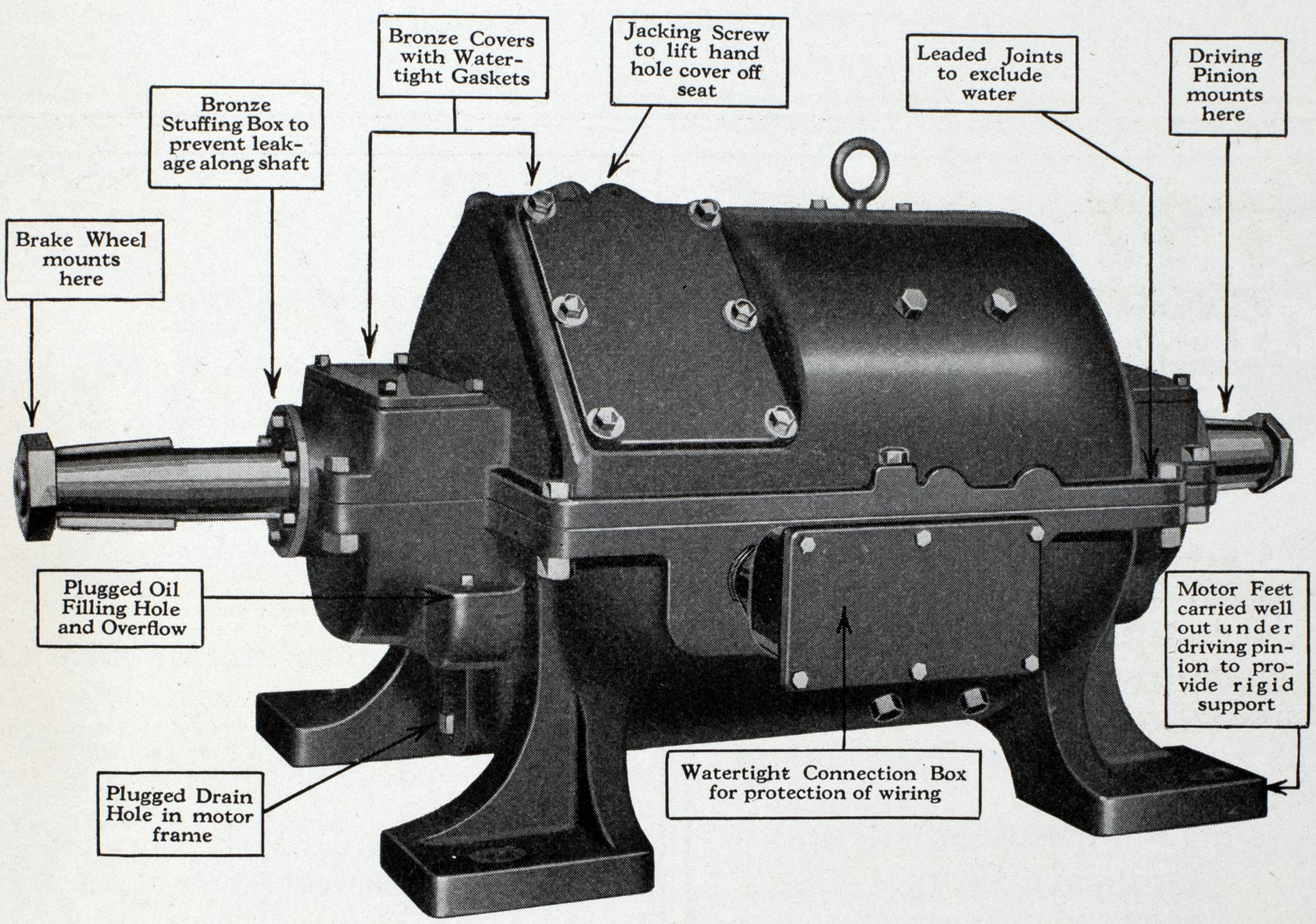

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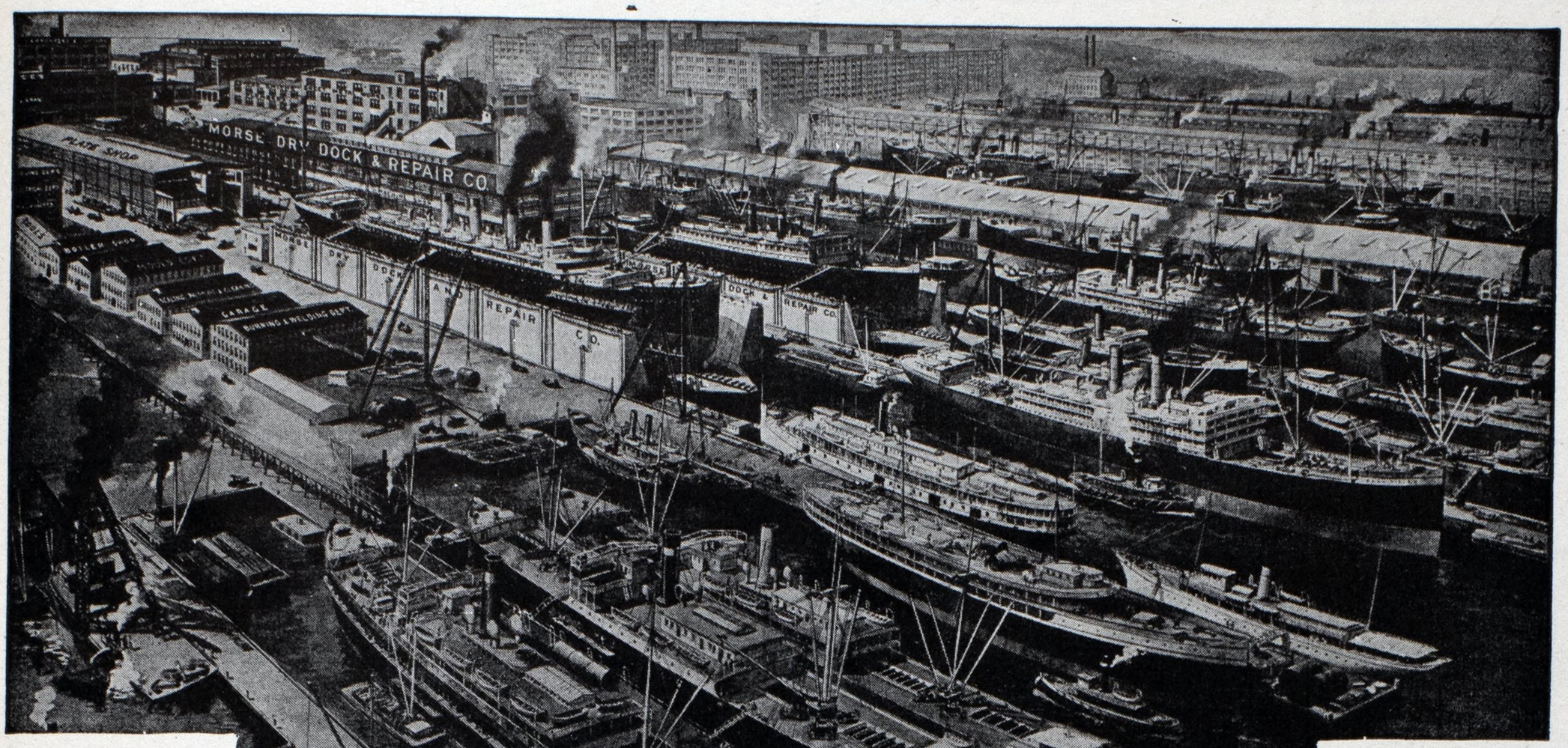

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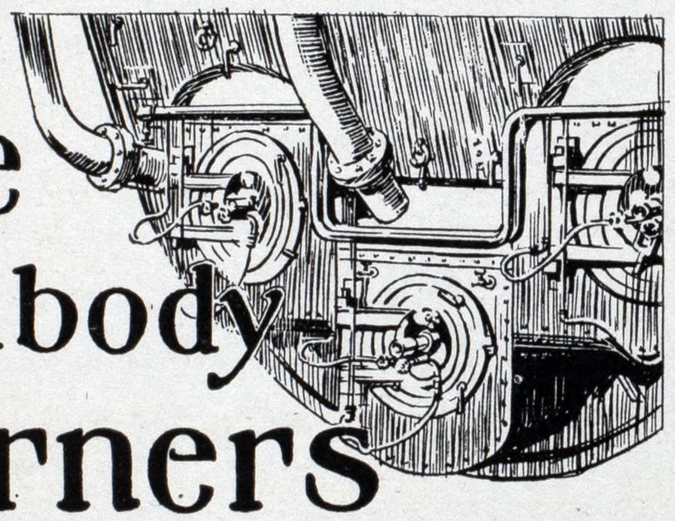

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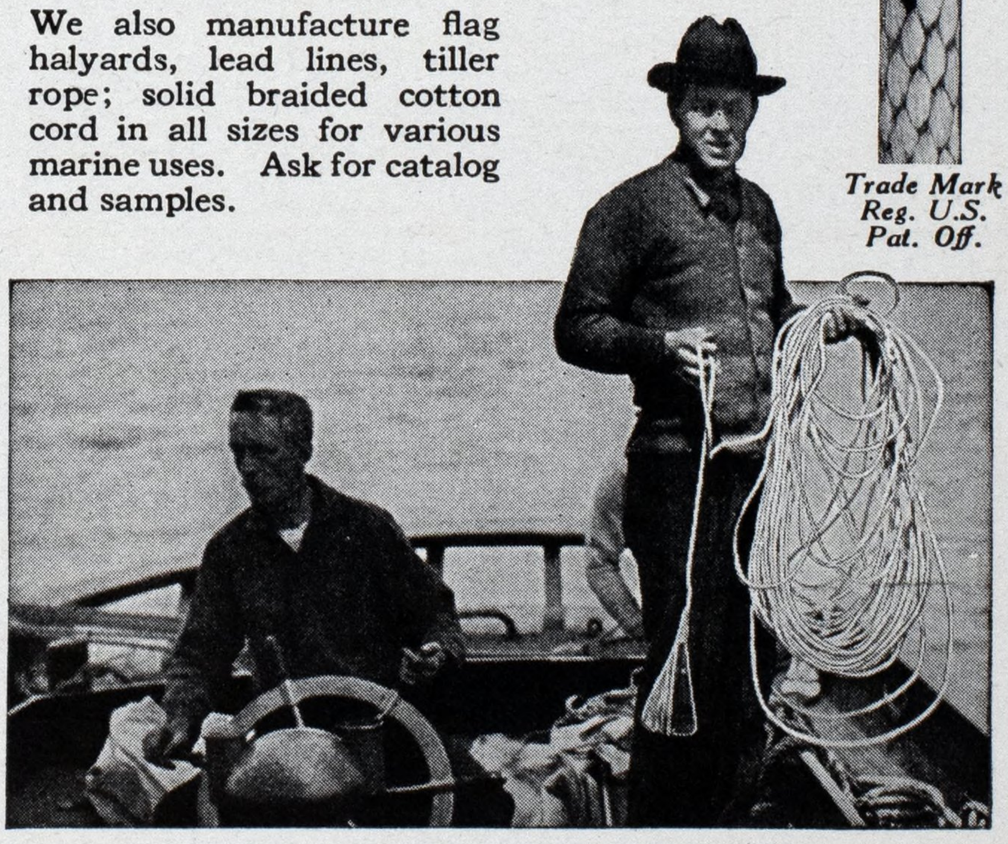

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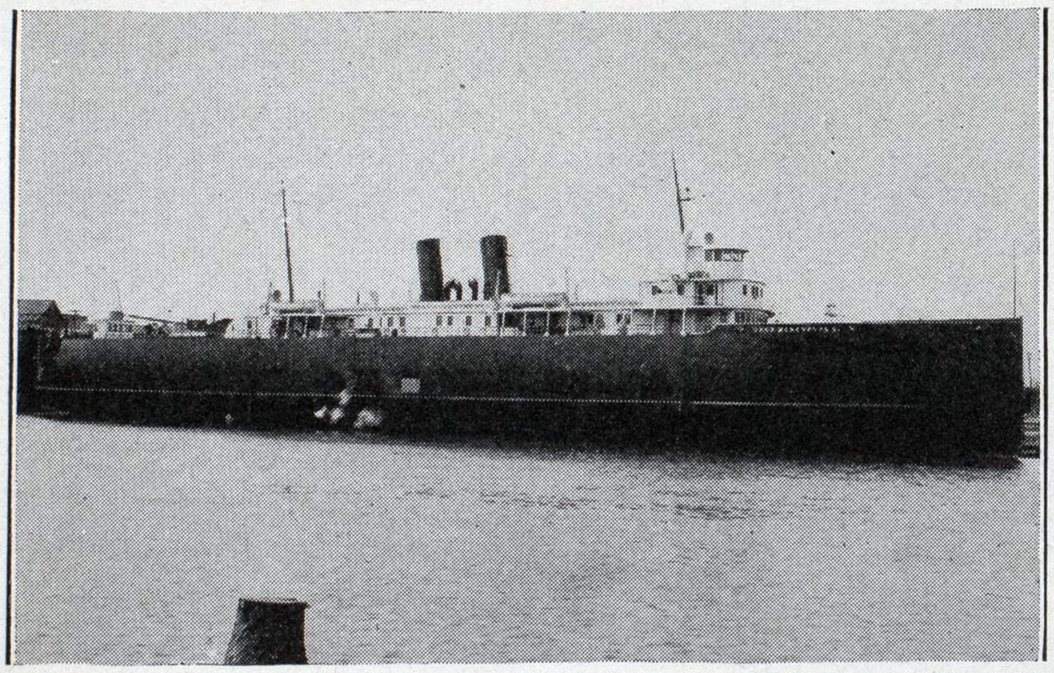

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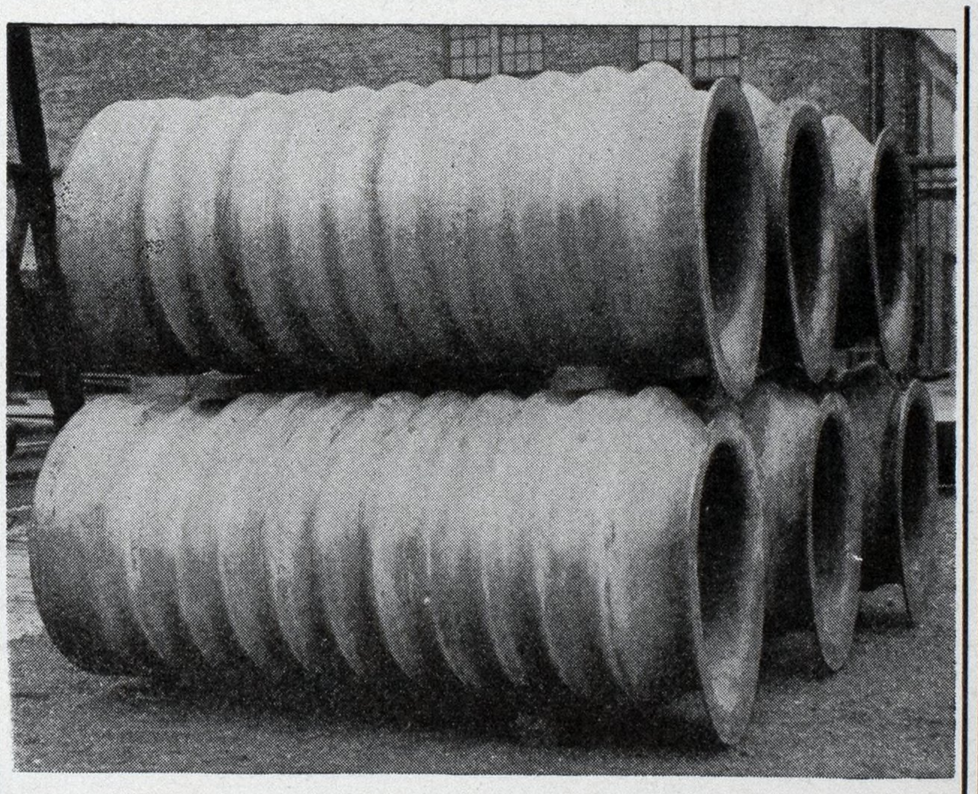

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GRAPHITE PIPE JOINT COMPOUNDS
Dixon, Jos., Crucible Co., Jersey City, N. J.

GREASE
Texas Co., The,
17 Battery Place, New York City.
Vacuum Oil Co.,
61 Broadway, New York City.

GREASE (Launching)
Texas Co., The,
17 Battery Place, New York City.
Vacuum Oil Co.,
61 Broadway, New York City.

HARDWARE (Marine) — See MARINE HARDWARE

HATCH FASTENERS
Mullholland Hatch-Fastener Co.,
Marion Bldg., Cleveland, O.

HAWSERS (Manila)
Columbian Rope Co., Auburn, N. Y.
Samson Cordage Works, Boston, Mass.
Whitlock Cordage Co.,
46 South St., New York City.

HEATERS AND PURIFIERS (Feed Water)
Davis Engineering Co.,
90 West St., New York City.
Griscom-Russell Co.,
285 Madison Ave., New York City.
Westinghouse Electric & Mfg. Co.,
So. Philadelphia, Pa.

HEATING EQUIPMENT
Sturtevant, B. F., Co.,
Hyde Park, Boston, Mass.
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

HEATING STOVES
Stamford Foundry Co., Stamford, Conn.

HOISTING ENGINES
Hyde Windlass Co., Bath, Me.

HOISTS (Air)
American Shipbuilding Co.,
Foot of W. 54th St., Cleveland, O

HOOPS AND BANDS
Acme Steel Co.,
2840 Archer Ave., Chicago, Ill.

HULLS (Steel)
Ellis Channel System, Inc.,
33 Rector St., New York City.

ICE MACHINES — See REFRIGERATING MACHINERY

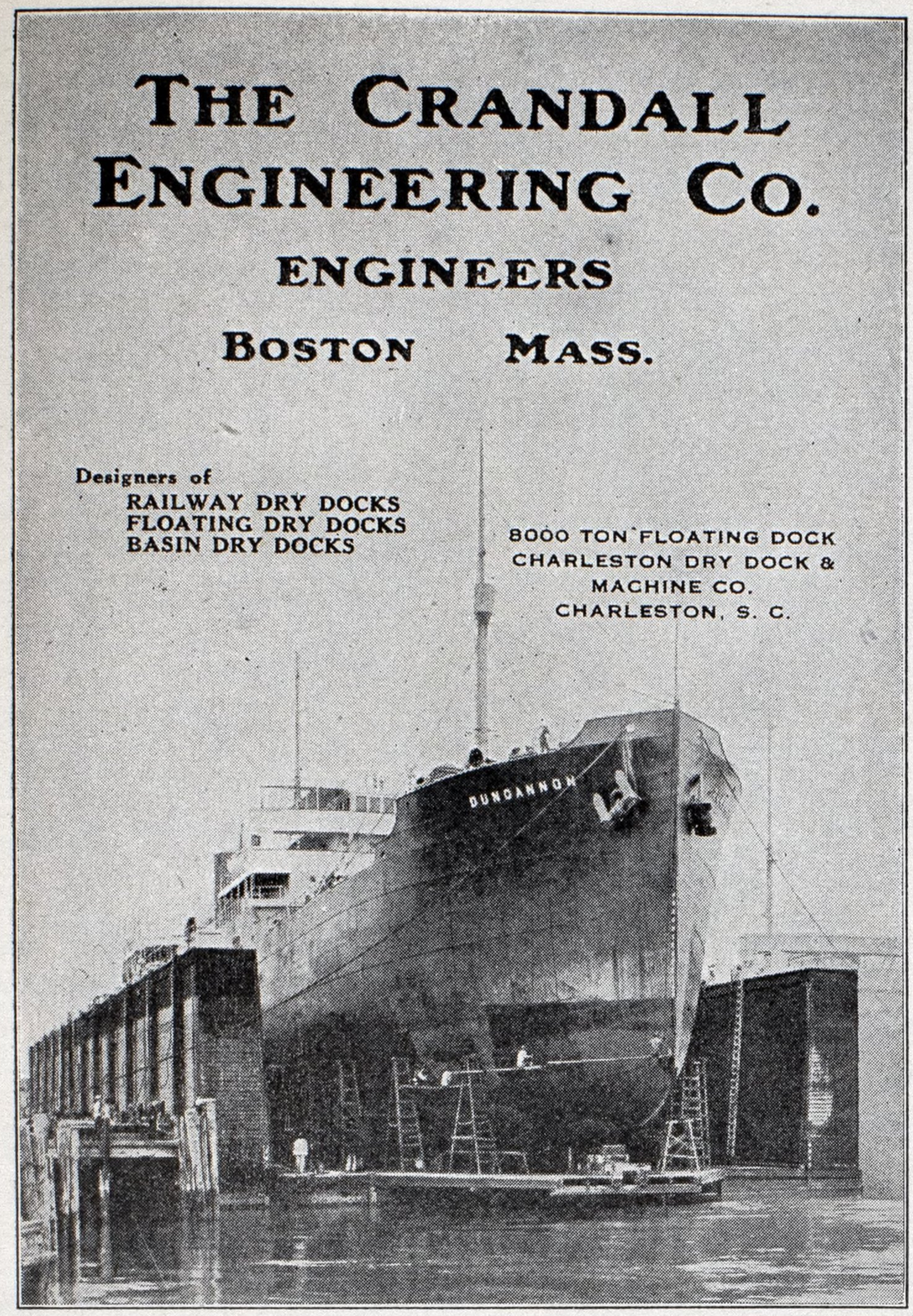
See Index to Advertisements for Pages Containing Advertisements of Companies Listed Above

THE CRANDALL ENGINEERING CO.

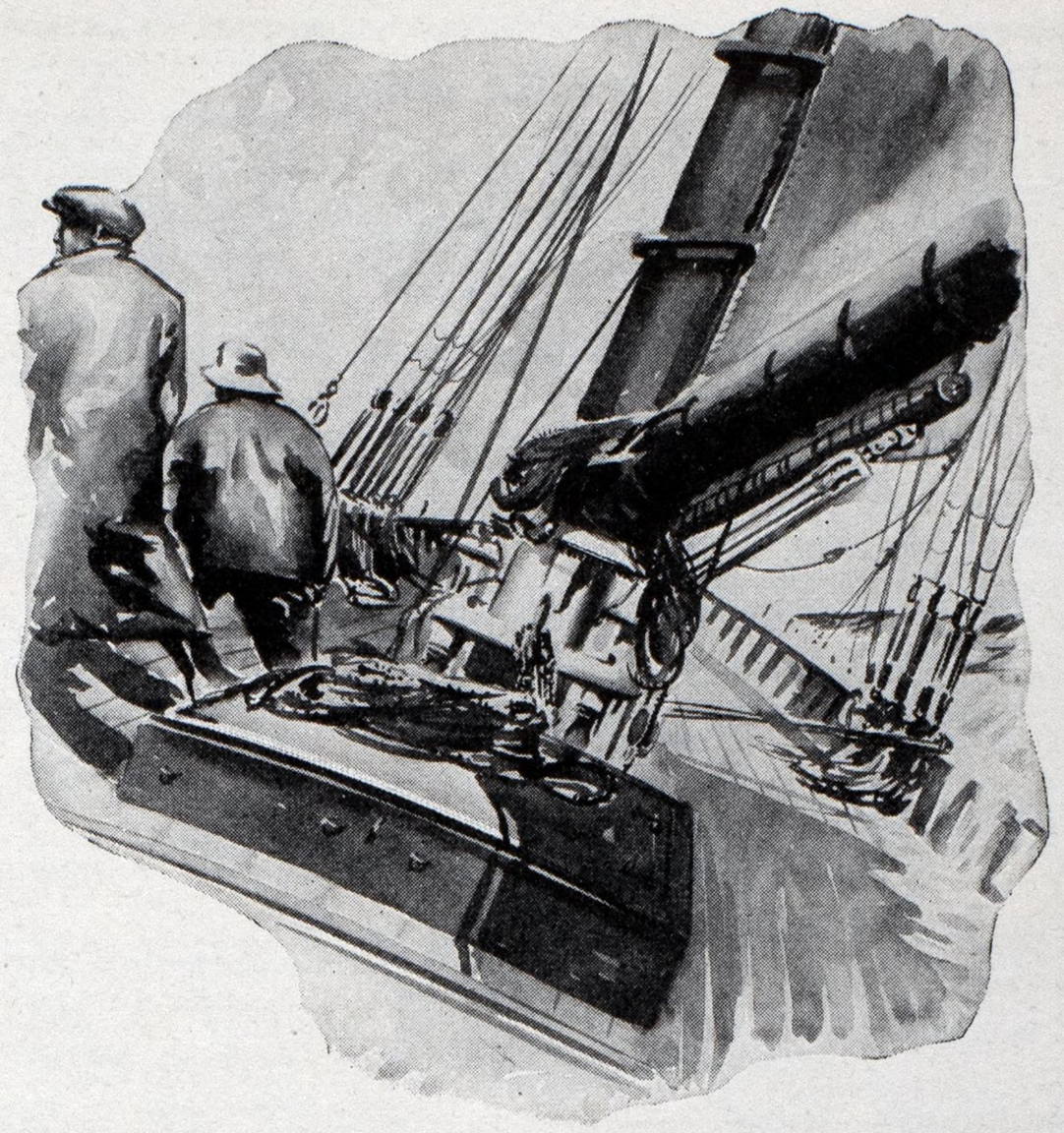
ENGINEERS

BOSTON MASS.

Designers of
RAILWAY DRY DOCKS
FLOATING DRY DOCKS
BASIN DRY DOCKS



8000 TON FLOATING DOCK
CHARLESTON DRY DOCK &
MACHINE CO.
CHARLESTON, S. C.



"Then Ho for the sea so damp and free"

Deep sea sailormen realize that in a well-caulked tight bottom lies not only the welfare of the vessel and the crew but the safe delivery of the cargo.

For a hundred years,

STRATFORD OAKUM

has been keeping the ocean out of the finest ships that sail. Sailors depend on Stratford Oakum because they know it is the best.

Stratford Oakum is most economical to use. Wastage is very small, less labor is required to spin and caulk and it "stays put," whether in deck, side or bottom.

Seams right-caulked with Stratford Oakum will stay tight longer than when any other material is used.

Be sure you get Stratford Oakum

George Stratford Oakum Company

Jersey City, New Jersey

Also Manufacturers of Cotton Wiping Waste

*2

Locks and Latches
for
Doors and Hatches

In constructing ships of all types material savings are made possible by using Tiebout standardized hardware and supplies.

It is Tiebout's privilege to co-operate with ship and boat builders by supplying standardized equipment from stock at lowest prices.

W. & J. TIEBOUT

Marine Hardware

118 Chambers Street **New York**

Standard on the World's Greatest Ships

Paracoil
MARINE EQUIPMENT

Operating for years without interruption on many of the largest ships afloat, Paracoil equipment is accepted as standard throughout the marine world.

Paracoil equipment includes the following: Feed Water Heaters, Oil Heaters, Oil Coolers, Feed Water Filters and Grease Extractors, Evaporators, Distillers, Steam Traps, Exhaust Gas, Steam or Hot Water Generators—for Diesel Plants, and Rand System for Heating Bunker Oil.

Write for our interesting catalog.

DAVIS ENGINEERING CORP.

90 West St. **New York City**

Factory: Elizabeth, N. J.

INSURANCE (Marine)
Boland & Cornelius,
Marine Trust Bldg., Buffalo, N. Y.

INTERNAL COMBUSTION ENGINES
Burmeister & Wain,
Maskin-og Skibsbyggeri, Copenhagen, Denmark

LAMPS (Mazda and Arc)
General Electric Co., Schenectady, N. Y.

LIFEBOATS
Lane, C. M., Lifeboat Co., Inc.,
856 Humboldt St., Brooklyn, N. Y.

LIFESAVING EQUIPMENT
Lane, C. M., Lifeboat Co., Inc.,
856 Humboldt St., Brooklyn, N. Y.

LIGHTING EQUIPMENT
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

LOGS (Patent)
Walker, Thomas, & Son, Ltd.,
58 Oxford St., Birmingham, England.

LUBRICATING OIL
Texas Co., The,
17 Battery Place, New York City.
Vacuum Oil Co.,
61 Broadway, New York City.

MACHINERY (Marine)
American Shipbuilding Co.,
Foot of W. 54th St., Cleveland, O.
Bessemer Engine Co., Grove City, Pa.
Bethlehem Shipbuilding Corp., Ltd.,
Bethlehem, Pa.
Chicago Shipbuilding Co., So. Chicago, Ill.
Great Lakes Engineering Works,
River Rouge, Mich.
Manitowoc Ship Building Corp.,
Manitowoc, Wis.
Maryland Dry Dock Co., Baltimore, Md.
Toledo Ship Building Co., Toledo, O.

MACHINISTS
American Shipbuilding Co.,
Foot of W. 54th St., Cleveland, O.
Busch-Sulzer Bros.-Diesel Engine Co.,
2nd & Utah Sts., St. Louis, Mo.
Milwaukee Dry Dock Co., Milwaukee Wis.
New York Shipbuilding Co., Camden, N. J.

MANILA OAKUM—See OAKUM (Marine, Rope, Packings, Plumbers)

MARINE DECKING—See DECKING

MARINE ENGINES
Burmesiter & Wain,
Maskin-og Skibsbygerri, Copenhagen, Denmark

MARINE GLUE
Ferdinand, L. W., & Co.,
152 Kneeland St., Boston, Mass.

MARINE GLUE (Liquid)
Ferdinand, L. W., & Co.,
152 Kneeland St., Boston, Mass.

MARINE HARDWARE
Tiebout, W. & J.,
118 Chambers St., New York City.

MARINE RAILWAY BUILDERS
Crandall Engineering Co.,
134 Main St., Cambridge, Mass.

MARINE SUPPLIES
Tiebout, W. & J.,
118 Chambers St., New York City.

MATERIAL HANDLING EQUIPMENT
Smith, Leathem D., Dock Co.,
Sturgeon Bay, Wis.

MOTOR GENERATOR SETS
Diehl Manufacturing Co.,
Elizabethport, N. J.
Engberg's Electric & Mechanical Works,
22 Vine St., St. Joseph, Mich.
Fairbanks, Morse & Co.,
900 South Wabash Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

MOTORS (Electric)
Diehl Manufacturing Co.,
Elizabethport, N. J.
Engberg's Electric & Mechanical Works,
22 Vine St., St. Joseph, Mich.
Fairbanks, Morse & Co.,
900 South Wabash Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

MOTORS (Winch)
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

NAUTICAL INSTRUMENTS
Ritchie, E. S., & Sons, Brookline, Mass.

NITROGEN (Gas)
Linde Air Products Co.,
30 East 42nd St., New York City.

OAKUM (Marine, Rope, Packings, Plumbers)
Stratford, George, Oakum Co.,
165 Cornelison Ave., Jersey City, N. J.

OIL BURNERS
Peabody Engineering Corp.,
110 E. 42nd St., New York City.

OIL BURNING EQUIPMENT
Babcock & Wilcox Co.,
85 Liberty St., New York City.
Bethlehem Shipbuilding Corp., Ltd.,
Bethlehem, Pa.
Sturtevant, B. F., Co.,
Hyde Park, Boston, Mass.

OIL FOR ALL PURPOSES (Marine)
Texas Co., The,
17 Battery Place, New York City.
Vacuum Oil Co.,
61 Broadway, New York City.

OXYGEN (Gas)
Linde Air Products Co.,
30 East 42nd St., New York City.

PACKING RINGS
American Hammered Piston Ring Co.,
Baltimore, Md.

PASSENGER SERVICE
Hamburg-American Line,
39 Broadway, New York City.

PIPE (Iron and Steel)
American Spiral Pipe Works,
1440 S. 49th St., Chicago, Ill.

PIPING (Cold Storage)
Frick Company, Waynesboro, Pa.

PISTON RING MANUFACTURERS
American Hammered Piston Ring Co.,
Baltimore, Md.

PLATES (Rolled Zinc)
Hazel-Atlas Glass Co.,
16th & Market St., Wheeling, W. Va.

POWDERED COAL BURNERS
Peabody Engineering Corp.,
110 E. 42nd St., New York City.

PROPELLER BLADES AND HUBS
Sheriffs Mfg. Co., Milwaukee, Wis.

PROPELLER WHEELS
American Shipbuilding Co.,
Foot of W. 54th St., Cleveland, O.
Detroit Ship Building Co., Detroit, Mich.
Great Lakes Engineering Works,
River Rouge, Mich.
Milwaukee Dry Dock Co., Milwaukee, Wis.
Newport News Shipbuilding & Dry Dock Co.,
233 Broadway, New York City.
Sheriffs Mfg. Co., Milwaukee, Wis.
Toledo Ship Building Co., Toledo, O.
Trout, H. G. Co.,
220 Ohio St., Buffalo, N. Y.

PROPELLERS
Bethlehem Shipbuilding Corp., Ltd.,
Bethlehem, Pa.
Hyde Windlass Co., Bath, Me.
Newport News Shipbuilding & Dry Dock Co.,
233 Broadway, New York City.

PUMPS
Bethlehem Shipbuilding Corp., Ltd.,
Bethlehem, Pa.
Dean Brothers Co.,
323 W. Tenth St., Indianapolis, Ind.
Fairbanks, Morse & Co.,
900 South Wabash Ave., Chicago, Ill.
Great Lakes Engineering Works,
River Rouge, Mich.
Ingersoll-Rand Co.,
11 Broadway, New York City.
Warren Steam Pump Co., Inc., Warren, Mass.

PUMPS (Ballast)
Dean Brothers Co.,
323 W. Tenth St., Indianapolis, Ind.
Warren Steam Pump Co., Inc., Warren, Mass.

PUMPS (Bilge)
Dean Brothers Co.,
323 W. Tenth St., Indianapolis, Ind.
Fairbanks, Morse & Co.,
900 South Wabash Ave., Chicago, Ill.
Warren Steam Pump Co., Inc., Warren, Mass.

PUMPS (Boiler Feed)
Dean Brothers Co.,
323 W. Tenth St., Indianapolis, Ind.
Fairbanks, Morse & Co.,
900 South Wabash Ave., Chicago, Ill
Warren Steam Pump Co., Inc., Warren, Mass

PUMPS (Direct Acting)
Dean Brothers Co.,
323 W. Tenth St., Indianapolis, Ind

PUMPS (Power)
Dean Brothers Co.,
323 W. Tenth St., Indianapolis, Ind.
Fairbanks, Morse & Co.,
900 South Wabash Ave., Chicago, Ill.

PUMPS (Rotary)

PUMPS (Steam)
Dean Brothers Co.,
323 W. Tenth St., Indianapolis, Ind.
Fairbanks, Morse & Co.,
900 South Wabash Ave., Chicago, Ill.
Warren Steam Pump Co., Inc., Warren, Mass.

PUMPS (Vacuum)
Dean Brothers Co.,
323 W. Tenth St., Indianapolis, Ind.

PURIFICATION SYSTEMS—See WATER PURIFICATION SYSTEMS

RADIO COMPASS AND DIRECTION FINDER
Radiomarine Corp. of America,
66 Broad St., New York City.

RADIO EQUIPMENT
Radiomarine Corp. of America,
66 Broad St., New York City.

RAFTS
Lane, C. M., Lifeboat Co., Inc.,
856 Humboldt St., Brooklyn, N. Y.

RAILWAY DRY DOCKS
Crandall Engineering Co.,
134 Main St., Cambridge, Mass.

RANGES
Stamford Foundry Co., Stamford, Conn.

REFRIGERATING MACHINERY
Frick Company, Waynesboro, Pa.

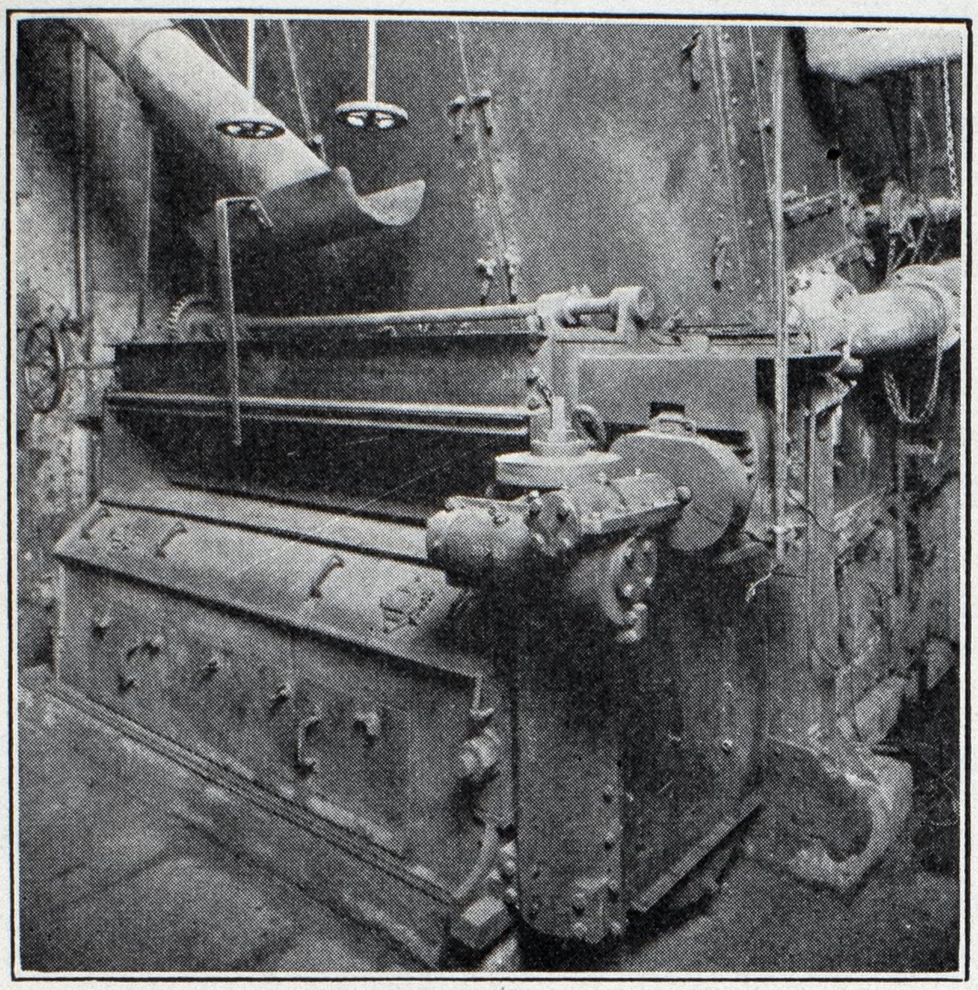
REPAIRS
Maryland Dry Dock Co., Baltimore, Md.

REPAIRS (Electric)
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

REPAIRS (Marine)
American Shipbuilding Co.,
Foot of W. 54th St., Cleveland, O.
Bethlehem Shipbuilding Corp., Ltd.,
Bethlehem, Pa.
Chicago Shipbuilding Co., So. Chicago, Ill.
Great Lakes Engineering Works,
River Rouge, Mich.
Manitowoc Ship Building Corp.,
Manitowoc, Wis.
Newport News Shipbuilding & Dry Dock Co.,
233 Broadway, New York City.
New York Shipbuilding Co., Camden, N. J.
Sun Shipbuilding & Dry Dock Co.,
Chester, Pa.
Todd Shipyards Corp.,
25 Broadway, New York City.
Toledo Ship Building Co., Toledo, O.

See Index to Advertisements for Pages Containing Advertisements of Companies Listed Above

10 to 15 Per Cent Saving in Coal



BABCOCK & WILCOX FORCED BLAST CHAIN GRATE STOKERS

When fitted to Babcock & Wilcox marine boilers mean:

At least ten per cent saving in coal over hand firing

More flexible than hand firing when maneuvering

Efficient burning of a wide variety of coals

Simplicity in ash removal

Light labor in operation

Reduction in personnel with the larger installations

Particulars on request

THE BABCOCK & WILCOX CO.

Manufacturers of Marine Water Tube Boilers Since 1895

Sheldon Building
SAN FRANCISCO

85 Liberty St.
NEW YORK, N. Y.

Guardian Building
CLEVELAND, O.

ROLLED ZINC
COILS
STRIPS

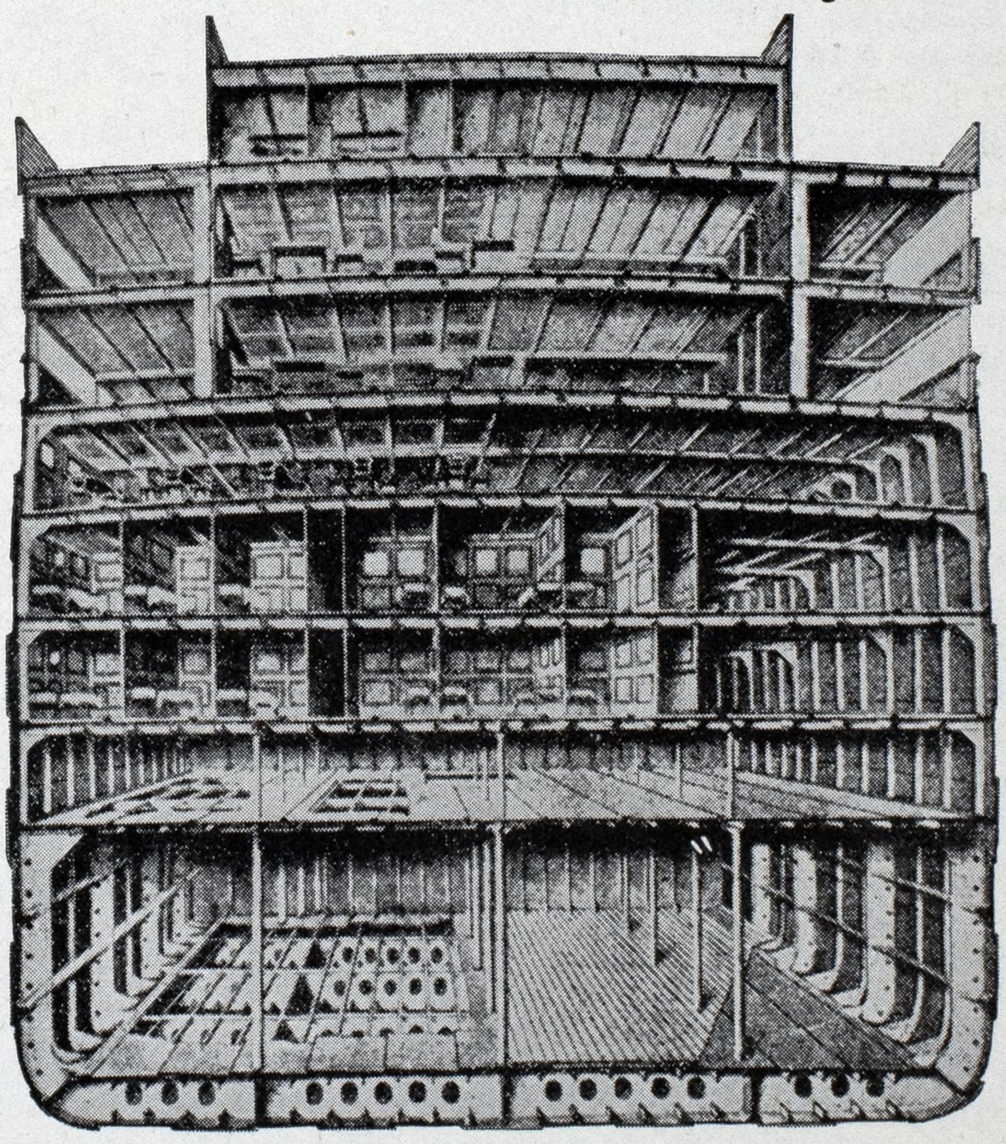
ZINC BOILER PLATES

Registered Trade Mark

HAZEL-ATLAS GLASS CO.
ROLLING MILLS
WHEELING, W. VA.

Eastern Sales Office—53 Park Pl., N Y C
Western Sales Office—202 Davis St , San Francisco Cal
Southern Sales Office—505 Marine Bk Bldg., New Orleans, La

Isherwood Combination System



Sectional View of Interior of Passenger Liner designed on the Isherwood Combination System

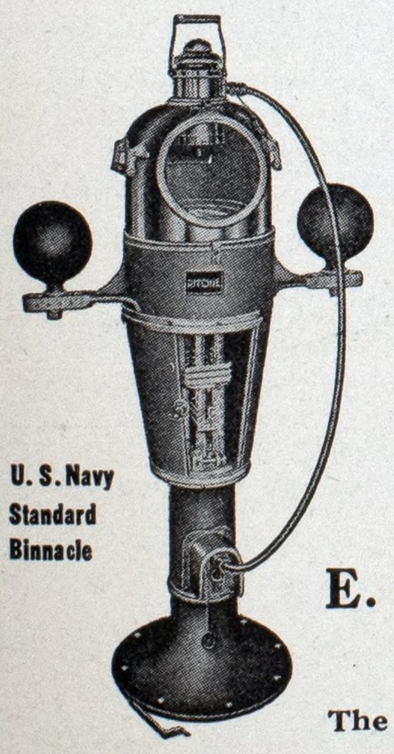
(In a vessel of this type, deep transverses are recommended for hold construction, but are not essential.)

Adaptable to any type but particularly advantageous for passenger liners.

SIR JOSEPH W. ISHERWOOD & CO., Ltd.

17 BATTERY PLACE, NEW YORK
and 4, LLOYD'S AVENUE, LONDON, E. C. 3

2



U. S. Navy Standard Binnacle

THE RITCHIE LIQUID COMPASS

The Standard Liquid Compass the world over.

Used Exclusively in U. S. Navy for over 40 years.

Over 65,000 on Merchant Vessels in all parts of the world.

Made in all sizes 2 to 12" dia.

Magnets for adjusting Purposes.

E. S. RITCHIE & SONS

Brookline, Mass., U. S. A.

Agents for the Great Lakes,
The Upson-Walton Company, Cleveland, Ohio

REPAIRS (Marine Engines)
Bath Iron Works Corporation, Bath, Maine.
Collingwood Shipyards, Ltd., Collingwood, Ont., Canada

REPAIRS (Turbine)
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

REVOLUTION COUNTERS
Cummings Machine Works, 255 Atlantic Ave., Boston, Mass.
Sperry Gyroscope Co., Manhattan Bridge Plaza, Brooklyn, N. Y.

ROPE (Manila, Net, Sisal, and Other Hard Fiber Cordage)
Columbian Rope Co., Auburn, N. Y.
Samson Cordage Works, Boston, Mass.
Whitlock Cordage Co., 46 South St.. New York City.

ROPE (Transmission)
Columbian Rope Co., Auburn, N. Y.

ROPE OAKUM
Stratford, George, Oakum Co., Jersey City, N. J.

RUBBER TILE
Selby Battersby & Co., 810 Noble St., Philadelphia, Pa.

RUST PREVENTATIVE (Oil)
Texas Co., The, 17 Battery Place, New York City.
Vacuum Oil Co., 61 Broadway, New York City.

SAFETY VALVES (Marine)
Star Brass Mfg. Co., 53 Oliver St., Boston, Mass.

SCHOONERS (Auxiliary)
American Shipbuilding Co., Foot of W. 54th St., Cleveland, O.
Chicago Shipbuilding Co., So. Chicago, Ill.
Milwaukee Dry Dock Co., Milwaukee, Wis.
Toledo Ship Building Co., Toledo, O.

SEARCHLIGHTS (Incandescent and Arc)
General Electric Co., Schenectady, N. Y.

SELF UNLOADING EQUIPMENT
Smith, Leathem D., Dock Co., Sturgeon Bay, Wis.

SEPARATORS (Oil)
Babcock & Wilcox Co., 85 Liberty St., New York City.

SHAFTING COVERING
Paper & Textile Machinery Co., Sandusky, O.

SHIPBUILDERS
American Shipbuilding Co., Foot of W. 54th St., Cleveland, O.
Bath Iron Works Corporation, Bath, Maine.
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Collingwood Shipyards, Ltd., Collingwood, Ont., Canada.
Great Lakes Engineering Works, River Rouge, Mich.
Manitowoc Ship Building Corp., Manitowoc, Wis.
Maryland Dry Dock Co., Baltimore, Md.
Newport News Shipbuilding & Dry Dock Co., 233 Broadway, New York City.
New York Shipbuilding Co., Camden, N. J.
Smith, Leathem D., Dock Co., Sturgeon Bay, Wis.
Sun Shipbuilding & Dry Dock Co., Chester, Pa.
Todd Shipyards Corp., 25 Broadway, New York City.
Toledo Ship Building Co., Toledo, O.

SHIPBUILDING SYSTEMS
Isherwood, J. W., 17 Battery Place, New York City.

SHIP CONSTRUCTION (Channel System)
Ellis Channel System, Inc., 33 Rector St., New York City.

SHIP LOGS
Walker, Thomas, & Son, Ltd. 58 Oxford St., Birmingham, England.

SHIP REPAIR (Marine)
Collingwood Shipyards, Ltd., Collingwood, Ont., Canada.

SHIP REPAIRS
Morse Dry Dock & Repair Co., Foot of 56th St., Brooklyn, N. Y.

SLEEVES (Rubber)
Paper & Textile Machinery Co., Sandusky, O.

SPUN OAKUM
Stratford, George, Oakum Co., Jersey City, N. J.

STEAMSHIP LINES (Passenger and Freight)
Hamburg-American Line, 39 Broadway, New York City.

STEAM GAGES
Star Brass Mfg. Co., 53 Oliver St., Boston, Mass.

STEAM TRAPS
Davis Engineering Co., 90 West St., New York City.

STEEL BARGES—See BARGES (Steel)

STEERING ENGINES
Hyde Windlass Co., Bath, Me.

STEERING ENGINES (Electric)
Benson Electric Co., Superior, Wis.

STEERING GEARS
American Shipbuilding Co., Foot of W. 54th St., Cleveland, O.
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Hyde Windlass Co., Bath, Me.

STEERING GEARS (Electric)
Benson Electric Co., Superior, Wis.

STEERING MOTOR (Electric)
Benson Electric Co., Superior, Wis.

STORAGE BATTERIES—See BATTERIES

STOVES
Stamford Foundry Co., Stamford, Conn.

STRIP STEEL
Acme Steel Co., 2840 Archer Ave., Chicago, Ill.

SWITCHBOARDS
Engberg's Electric & Mechanical Works, 22 Vine St., St. Joseph, Mich.
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

TELEMOTORS
Benson Electric Co., Superior, Wis.
Hyde Windlass Co., Bath, Me.

TORSION METERS
Cummings Machine Works, 255 Atlantic Ave., Boston, Mass.

TOWING LINES
Columbian Rope Co., Auburn, N. Y.
Whitlock Cordage Co., 46 South St., New York City.

TRACTORS
Clark Tructractor Co., Battle Creek, Mich.
Mercury Mfg. Co., 4118 S. Halsted St., Chicago, Ill.
Terminal Engineering Corp., 17 Battery Place, New York City.

TRANSMISSION (Rope)—See ROPE (Transmission)

TRIMMERS
Benson Electric Co., Superior, Wis.

TRUCKS
Clark Tructractor Co., Battle Creek, Mich.
Mercury Mfg. Co., 4118 S. Halsted St., Chicago, Ill.
Terminal Engineering Corp., 17 Battery Place, New York City.

TUBES (Boiler, Stay, Yarrow)
Keating, E. F., Co., 446 Water St., New York City.

TURBINES (Electric)
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., So. Philadelphia, Pa.

TURBINES (Marine)
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Newport News Shipbuilding & Dry Dock Co., 233 Broadway, New York City.
Westinghouse Electric & Mfg. Co., So. Philadelphia, Pa.

TURBINES (Steam)
Newport News Shipbuilding & Dry Dock Co., 233 Broadway, New York City.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.
Westinghouse Electric & Mfg. Co., So. Philadelphia, Pa.

TWINE AND ROPE
Columbian Rope Co., Auburn, N. Y.
Samson Cordage Works, Boston, Mass.
Whitlock Cordage Co., 46 South St., New York City

VALVE RINGS
American Hammered Piston Ring Co., Baltimore, Md.

VALVES AND FITTINGS
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.

VENTILATING EQUIPMENT
Diehl Manufacturing Co., Elizabethport, N. J.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

WATER PURIFICATION SYSTEMS
Griscom-Russell Co., 285 Madison Ave., New York City.

WELDERS (Electric Arc)
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

WELDING AND CUTTING GAS
Prest-O-Lite Co., Inc., 30 East 42nd St., New York City.

WHISTLES
Star Brass Mfg. Co., 53 Oliver St., Boston, Mass.

WHISTLES (Electric)
Benson Electric Co., Superior, Wis.

WINCHES
Benson Electric Co., Superior, Wis.
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Dake Engine Co., Grand Haven, Mich.
Hyde Windlass Co., Bath, Me.

WINCHES (Electric)
Benson Electric Co., Superior, Wis.

WINDLASSES
American Shipbuilding Co., Foot of W. 54th St., Cleveland, O.
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Dake Engine Co., Grand Haven, Mich.
Hyde Windlass Co., Bath, Me.

WIRELESS MESSAGE SERVICE
Radiomarine Corp. of America, 66 Broad St., New York City.

WIRELESS SETS AND APPARATUS
Radiomarine Corp. of America, 66 Broad St., New York City.

WORKBOATS
Lane, C. M., Lifeboat Co., Inc., 856 Humboldt St., Brooklyn, N. Y.

ZINC (Plates Rolled)
Hazel-Atlas Glass Co., 16th & Market St., Wheeling, W. Va.

ZINC PRODUCTS
Hazel-Atlas Glass Co., 16th & Market St.. Wheeling W. Va.

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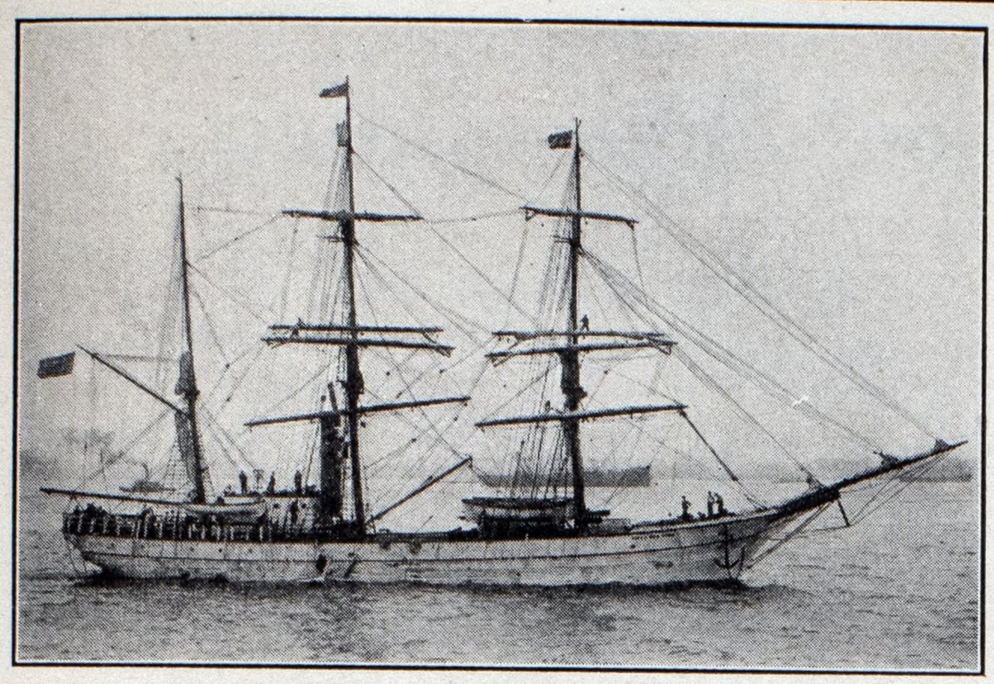
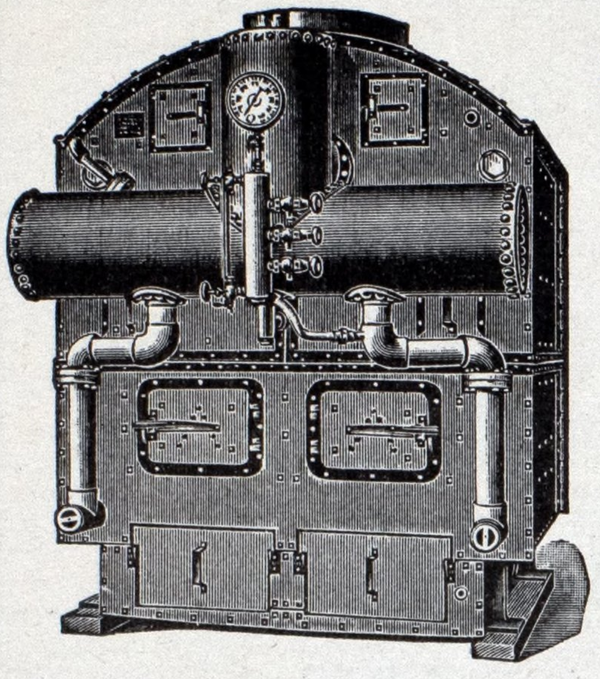


AUXILIARY BARKENTINE CITY OF NEW YORK
BYRD ANTARCTIC EXPEDITION

LANE LIFEBOATS
WERE SUPPLIED TO THE
BYRD ANTARCTIC EXPEDITION

KNOWN THE WORLD OVER — LANE — OLDEST IN THE U.S.A.

C. M. Lane Lifeboat Co., Inc.
Brooklyn, N. Y.



CATALOGUE FREE

Almy Water Tube Boiler Co.

Builders of Sectional Water Tube Boilers for all types of vessels

Providence, R. I. U. S. A.

Star Brass Mfg. Co.

53 Oliver Street -::- Boston, Mass.

MANUFACTURERS OF

Accurate "Non-corrosive" Pressure and Recording Gages, Revolution Counters, Marine Clocks.

Dead Weight Gage Testers.

Marine Safety and Relief Valves for all pressures.

Marine Whistles and Sirens.

Extra Heavy Renewable Globe, Angle and Check Valves.

Star Outside Spring Steam Engine Indicators.

HIGH GRADE THROUGHOUT
SPECIFY AND ORDER THE BEST.

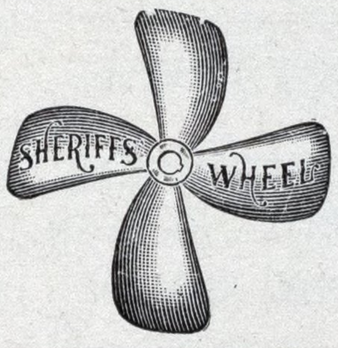
Branches: CHICAGO PITTSBURGH NEW YORK

Propeller Wheels, Marine Engines, Brass and Iron Castings. Large variety of Grate Bars in stock.

H. G. TROUT CO.
(King Iron Works)

226 Ohio St. BUFFALO, N. Y.

Phone: Seneca 5361



Propeller Wheels and Blades

to fit any hub.

Sheriffs Manufacturing Co.
Established 1854
Milwaukee, Wis.

ANDREW J. MORSE & SON, Inc.

221 High Street BOSTON, MASS.
Established 1837

Diving Apparatus and Submarine Armor
Fire Department Supplies
The Morse Monitor Nozzle
Callahan Shut-Off Nozzle

Oldman-Magee Boiler Works, Inc.

Boilers, Tanks, Stacks, Structural Work and Castings

Boiler Repairing Promptly Attended to Day or Night
MARINE WORK A SPECIALTY ELECTRIC WELDING

Works: 36-40 Illinois Street - BUFFALO, N. Y.

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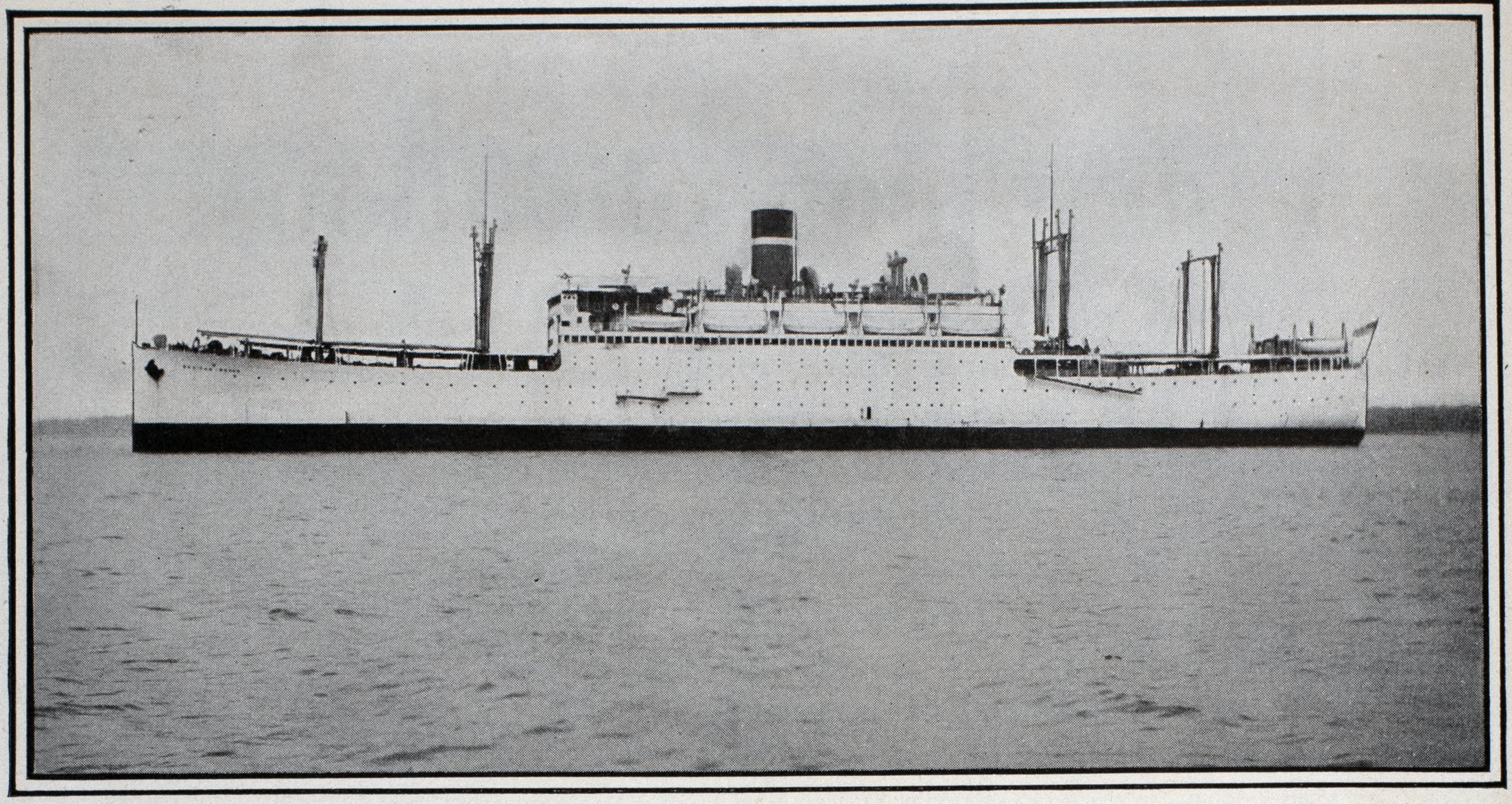

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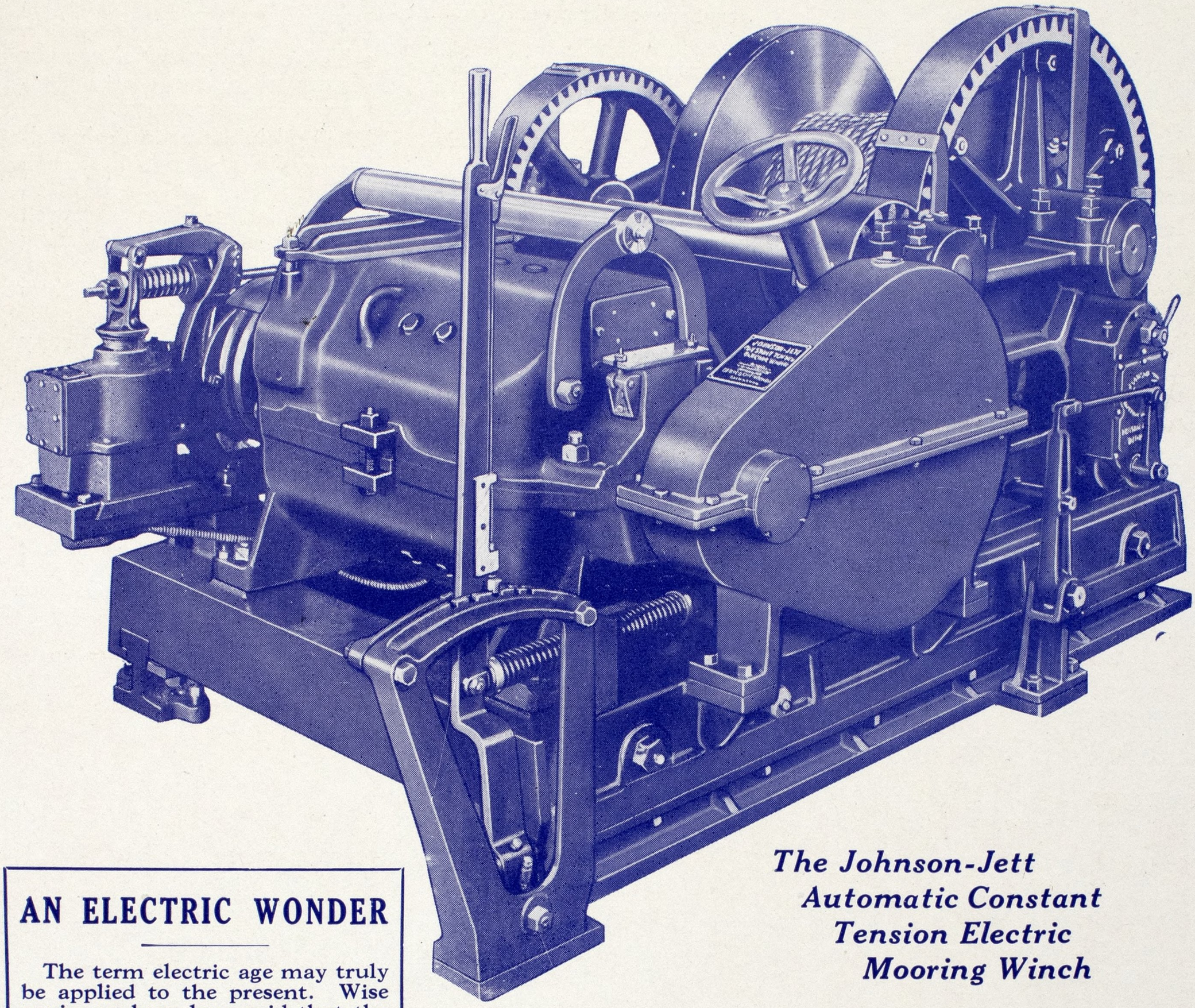

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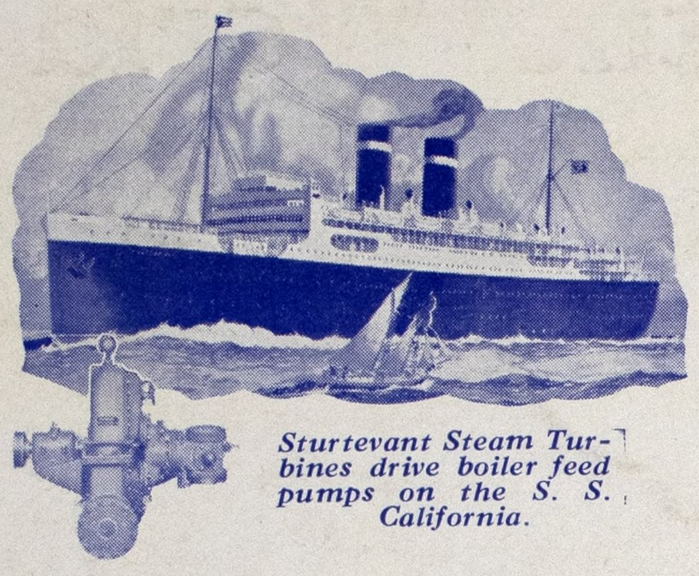

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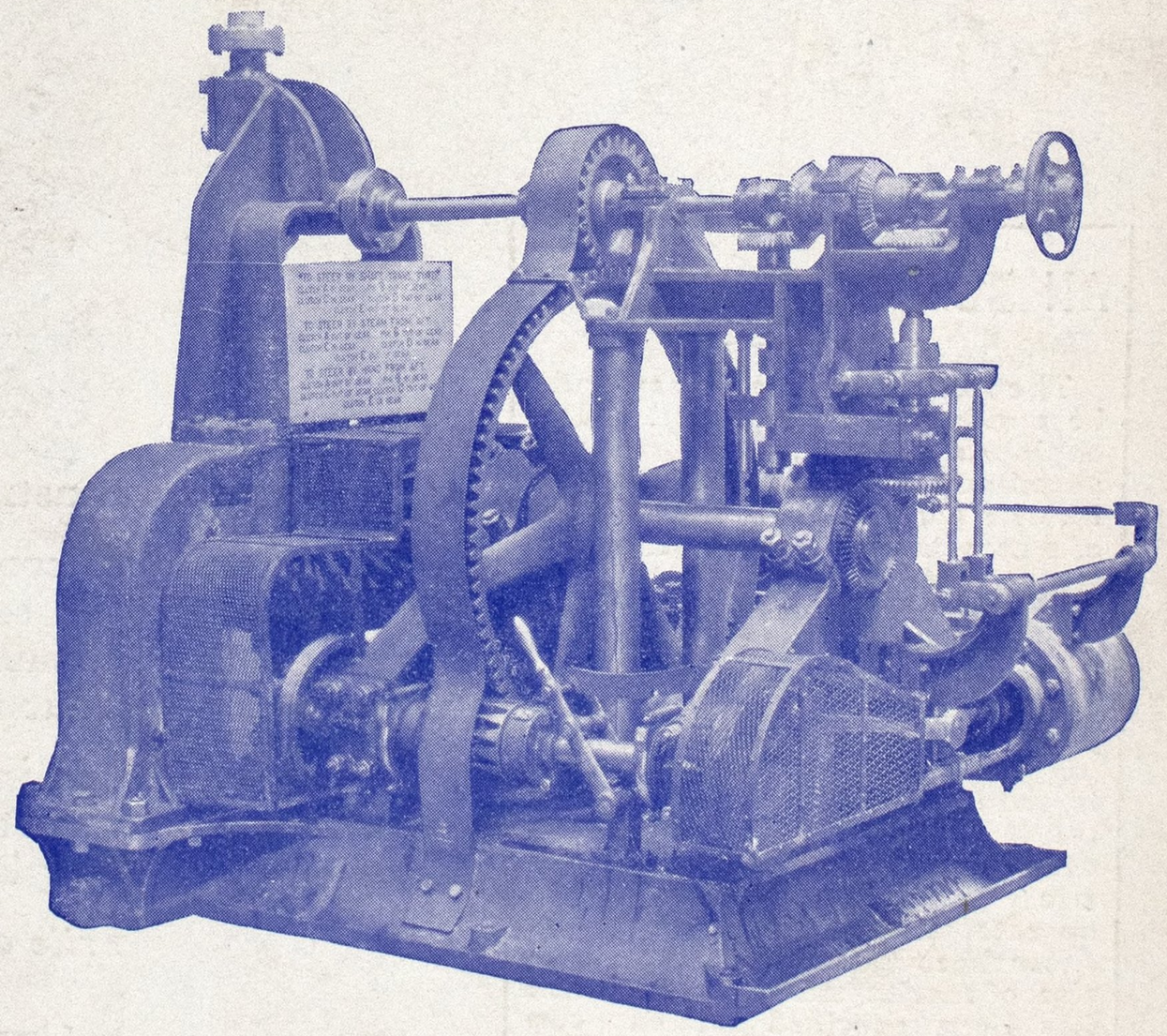

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